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To: Knittel, Janette
Subject: Former Rhone Poulenc Redline
Attachments: 2021-04-21 DRAFT FINAL Former Rhone Poulenc Pre-CMS Data Collection Work Plan.docx; EPA Comments_FRP Draft Pre-CMS WP QAPP_2021-04-21.xlsx; 2021-04-21 DRAFT FINAL FRP Revised QAPP.docx

Categories: FOIA, Print or Save, Rhone-Poulenc

Hi Janette,

Here is the comment tracking table and the redline of the Former Rhone Poulenc draft Work Plan and revised QAPP.

Note I added a tab to the excel sheet to include backup info related to one comment. Please feel free to give me a call to discuss if any of our responses are not clear.

Thanks,

Tasya

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Draft Pre-CMS Data Collection Work Plan

FORMER RHONE POULENC SITE

TUKWILA, WASHINGTON

April ~~5~~22, 2021

Prepared for:
Container Properties, LLC
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Certification

On behalf of the respondents, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this Draft Pre-CMS Data Collection Work Plan is true, accurate, and complete. As to those portions of the report for which I cannot personally verify accuracy, I certify under penalty of law that this report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who may manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: _____
Ms. Tasya Gray, DOF, Project Coordinator

Date: _____

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ACRONYMS AND ABBREVIATIONS

C	Celsius
CMS	Corrective Measures Study
CO ₂	carbon dioxide
COC	constituent of concern
DI	deionized
DO	dissolved oxygen
DOC	dissolved organic carbon
DOF	Dalton, Olmsted & Fuglevand, Inc.
EPA	Environmental Protection Agency
GAC	granular activated carbon
GWPT	groundwater pump & treat
HCIM	hydraulic control interim measure
mg/L	milligrams per liter
mV	millivolts
NTU	nephelometric turbidity units
Order	Administrative Order on Consent No. 1091-11-20-3008(h)
PCBs	Polychlorinated Biphenyls
PMP	Performance Monitoring Plan
PRG	Preliminary Remediation Goal
RCRA	Resource Conservation and Recovery Act
S/cm	siemens per centimeter
SVE	soil vapor extraction
SVOCS	semi-volatile organic compounds
TPH	total petroleum hydrocarbons
TDS	total dissolved solids
TSS	total suspended solids
VOCs	volatile organic compounds

1. INTRODUCTION

The former Rhone-Poulenc facility (site) is located adjacent to the Duwamish Waterway in Tukwila, Washington. This Pre-Corrective Measure Study Data Gaps Work Plan (work plan) was prepared in response to The Environmental Protection Agency's (EPA) March 2021 letter regarding the "Determination of Need for Additional Work" to identify data gaps and document plans for performing data collection to support preparation of the Corrective Measures Study (CMS). The CMS is being performed to address the requirements of the Resource Conservation and Recovery Act (RCRA) Administrative Order on Consent (Order) No. 1091-11-20-3008(h).

The site is located on about 750 feet of shoreline on the east side of the Lower Duwamish Waterway (LDW) just north of Slip 6, at approximately river mile 4.2. The West Parcel is bounded by the Museum of Flight and Raisbeck Aviation High School to the east, the 8801 E Marginal Way South Site to the north, the LDW to the west, and Slip 6 to the south (Figure 1). Investigation and cleanup of the Facility is being conducted under the above-referenced Order by former owners, including Solvay, Inc. (formerly Rhodia Inc.) and Bayer CropScience Inc. (corporate successors to the former Rhone-Poulenc company), and the current owner, Container Properties, L.L.C.

This work plan documents the objectives, data gaps, and data collection that will assist in preparation of the CMS.

1.1. Statement of the Problem

In 2006, the property underwent redevelopment and was split into two parcels. The East Parcel was investigated and cleaned up in cooperation with EPA. The EPA determined in 2017 that the East Parcel cleanup was fully complete with no controls required. This parcel was purchased and redeveloped by the Museum of Flight in 2006. The cleanup of West Parcel is ongoing in cooperation with EPA under the Order.

Significant progress has been made at the West Parcel in investigating groundwater, soil, and sediment contamination and controlling risks posed by contamination. An Agency dDraft CMS Work Plan was prepared in 2014 and ~~several investigations and the CO₂ Pilot Study studies have been conducted since that time~~after that. The draft CMS Work Plan presented contaminant conceptual model information to support evaluation of cleanup alternatives, but seven years have passed, additional treatment and natural degradation has occurred, and relevant site preliminary remediation goals have been revised. All of these factors warrant collection of additional data to:

1. Support engineering design information that will be used to assess corrective measures alternatives in the CMS.
2. Update the understanding of current contaminant conditions.

1.1.1. LONG TERM HYDRAULIC CONTROL OPERATIONS

The hydraulic control interim measure (HCIM) groundwater pretreatment system has been in operation since 2003 following installation of a low-permeability subsurface barrier wall, a groundwater recovery system, and a performance monitoring well network inside and outside the barrier wall. The HCIM

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resulted in control of a majority of the contaminated groundwater plume at the West Parcel and continues to work effectively as an interim measure. Construction of the barrier wall and groundwater recovery system is documented in the Hydraulic Control Interim Measures Implementation Report (RCI, 2003). The facility underwent redevelopment in 2006 including regrading and repaving, effectively capping the area encompassed by the barrier wall. Since 2008, the system has treated and discharged between 1 and 2 million gallons annually, dependent on precipitation driving the Duwamish Waterway river stage. The system has maintained a 72-hour averaged inward hydraulic gradient of greater than 1-foot since start of operations.

The ~~Agency~~ Draft CMS Work Plan (AMEC, 2014) included a preliminary screening of remedial technologies to be included in the CMS for the site. This evaluation included consideration of potentially shutting down the groundwater pumping component of the HCIM as part of the final remedy for the site. Conducting a temporary passive operation of the interim measure, under intensive monitoring, will allow water levels to rise and hydraulic gradients to equalize, while still being protective of potential down gradient receptors. This passive operation will provide data to allow for better evaluation of contaminant concentrations and migration.

1.1.2. POST-CARBON DIOXIDE PILOT STUDY DESIGN

A pilot study of the technology using carbon dioxide (CO₂) injection for neutralizing groundwater affected by high pH was conducted between 2018 and 2019. This technology has had a limited history of use; site-specific testing was conducted to assess its applicability and to collect detailed information needed to evaluate CO₂ injection as a component of the CMS alternatives. Results of the study were promising; however, full scale design questions have been identified that would be helpful to address prior to completing the CMS.

1.1.3. CURRENT CONDITIONS CONTAMINANT CONCENTRATIONS

The ~~Agency~~ Draft CMS Work Plan (AMEC, 2014) included presentation of site contaminants and historical operations, as a supplement to the much older 1995 RCRA Facility Investigation; however, EPA has requested that the CMS more clearly identify and consider:

- Historical contaminant source areas;
- Interim actions completed to address contamination; and
- Current site contaminant conditions still warranting remedial action.

In addition, the relevant Preliminary Remediation Goals (PRGs) require review and update based on current regulations, site conditions, and potential future site uses.

Select figures from the ~~Agency~~ Draft CMS work Plan (AMEC, 2014) and data figures discussed in a March 2021 technical meeting with EPA are provided in Attachment 1.

2. DATA COLLECTION OBJECTIVES

The objective of the data collection tasks described in this section is to address the data gaps identified in Section 1, specifically:

- Collecting information to be used for future evaluation of long term remedial options that may eliminate reliance on the HCIM.
- Collecting information to be used for future evaluation of full scale design detail for groundwater pH neutralization.
- Updating the conceptual site model for current conditions to be addressed by the final corrective measure.

These objectives are discussed further in the following subsections.

2.1. Hydraulic Control Performance Evaluation

The HCIM included the installation of a subsurface low-permeability barrier wall that surrounds, to the extent practicable, the environmentally impacted upland portion of the site. The area surrounded by the barrier wall is shown on Figure 2. The barrier wall is complemented by a system of groundwater extraction wells that pumps groundwater from inside the contained area to establish and maintain an inward-directed groundwater gradient. The recovered groundwater is pretreated in a permitted, on-site treatment system and is discharged to a King County treatment works. The surface of the site is almost entirely paved with asphalt. The pavement surface, in conjunction with a stormwater drainage system, minimizes infiltration of surface water to the subsurface area enclosed by the barrier wall (AMEC, 2014).

The objective of the hydraulic control performance evaluation proposed in this work plan is to determine how the HCIM hydrogeologic system and contaminant concentrations and transport behave during a period of temporary groundwater pumping cessation. The wall is one of the subsurface features that influences and will continue to influence the site conceptual model and must be considered as part of the basis for remedial design. This information will be useful. The shutdown period will allow for collection of the following information:

1. COC concentration information inside and outside of the HCIM wall.
2. Information related to how COCs could potentially migrate vertically and horizontally across the site without an inward hydraulic gradient.
3. Information related to the effects of water level rebound on the potential for COCs mobilizing from the vadose zone to groundwater.
4. Additional information to aid in design for corrective measures that does not rely on the HCIM as a long-term solution.

Proposed data collection includes assessing cross-wall containment transport and groundwater flow response under passive hydraulic containment conditions by allowing groundwater elevations inside the barrier wall to fluctuate with the exterior, tidally influenced, groundwater elevations.

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2.2. CO₂ Treatment Pre-Design Information

The CO₂ Neutralization Pilot Study Results report (Wood, 2020) confirmed the technical feasibility of injecting carbon dioxide for neutralizing high pH groundwater, but concluded that further evaluation was necessary to design for scaled-up neutralization of the high pH target area. In particular, the report suggested that ~~disproportionate relative remedial~~ costs for different application scenarios need to be evaluated in parallel with other site remediation action objectives to determine the most effective remediation plan. Pilot study injections were completed in 2018 with the last round of pilot study monitoring completed in February 2019.

The objective of additional monitoring is to confirm the report's conclusions on pH rebound and soil buffering capacity, as well as pH and contaminant migration. Confirming rebound and migration trends will aid in choosing and designing an effective corrective measure. Proposed data collection includes collecting groundwater data for geochemical parameters and targeted contaminants in the area treated by the pilot study.

2.3. Contaminant Conceptual Site Model Update

The historical sources of soil and groundwater contamination at the site were summarized in the 2014 Agency Draft CMS Work Plan (AMEC, 2014), and documented in numerous historical reports which describe the historical industrial operations that occurred at the site. ~~The 2014 work plan concluded that~~ Historical reports describe that sources are related primarily to the historical manufacture of artificial vanilla flavoring, or vanillin, through chemical processing of wood cellulose contributed to sources of contamination at the site. The manufacture of vanillin involved the use of toluene, copper sulfate, and caustic soda. Figure 3 shows historic operational areas, as documented in the 2014 Agency Draft CMS Work Plan (AMEC, 2014).

Since the implementation of the HCIM and other interim measures, groundwater conditions have changed. In order to proceed into the CMS it is important that the current site conditions be understood, in addition to documenting past sources and nature of contamination. This includes consideration of:

- Updates to Preliminary Remediation Goals (PRGs),
- Interim remedial measures conducted at the site, and
- Recently collected data at and near the site.

The objective of the data collection proposed for this data gap is to address uncertainty associated with the current conditions, as presented in the 2014 Agency Draft CMS ~~work~~ Work plan ~~Plan~~, and to adequately determine the nature and extent of contamination. Current soil, groundwater, and sediment contaminants and contaminant concentrations are needed to evaluate appropriate corrective measures technologies and address risk posed by contaminants in soil, groundwater, and sediments. Proposed tasks include:

- Assessing conditions of and rehabilitating monitoring wells, as necessary, for obtaining representative samples.

- Assess current conditions of the site groundwater by collecting and analyzing groundwater samples from select existing monitoring wells for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polycyclic biphenyls (PCBs), dioxins/furans, or metals in areas of the site for which data gaps exist spatially, vertically, and temporally.
- Developing a revised list of soil, groundwater, and sediment contaminants of concern (COCs) based on newly collected groundwater data, existing data, and updated PRGs.

2.3.1. CONSIDERATION FOR REVISED PRGS

EPA developed the original PRGs for the site in March 2014. Since then, revisions have been required because of changes to assumptions and criteria used to inform the PRGs. Accordingly, EPA prepared spreadsheets with current criteria for ~~each~~ soil and groundwater ~~constituents~~ and provided these to DOF in September 2020. In order to revise PRGs EPA developed a comprehensive list of potential COCs based on investigations that documented the presence of hazardous constituents in the soils, groundwater, sediments, and pore water at the site. In addition to quarterly groundwater monitoring, investigations of the West Parcel include the following:

- 1986 – Site Screening Investigation, Dames and Moore
- 1990 – RCRA Facility Assessment, PRC Environmental for EPA
- 1991 – Site Assessment, Landau Associates
- 1995 – Final RCRA Facility Investigation Report, CH2M Hill
- 1996 – Round 3 Data and Sewer Sediment Technical Memorandum, RCRA Facility Investigation
- 1998 – Interim Measures Report, PCB Remediation & Sewer Cleaning, Rhodia, Inc.
- 2000 – Round 6 Groundwater Monitoring, AGI
- 2001 – Geoprobe Investigation Report, AGI
- 2006 – Revised Pre-Demolition Investigation Report, Geomatrix Consultants
- 2006 – Voluntary Interim Measure Report, Hazardous Waste Storage Area and Transformer A Area Cleanup, Geomatrix Consultants
- 2007 – West Parcel Redevelopment Report, Geomatrix Consultants
- 2007 – Northwest Corner Affected Soil Removal Report, Geomatrix Consultants
- 2012 – Sediment Characterization Data Report, AMEC Environment & Infrastructure, Inc.
- 2012 – Shoreline Soil and Groundwater Characterization Data Report, AMEC Environment & Infrastructure, Inc.

The primary hazardous constituents known to be present at the site include toluene, copper, and elevated pH due to release of caustic materials. Additional potential COCs include PCBs, polycyclic aromatic hydrocarbons, semivolatile organic compounds, and several metals. A complete list of hazardous constituents and their maximum concentrations detected in soil, groundwater, and

sediments that was generated by EPA as part of reviewing PRGs at the Facility is provided in Attachment 2, along with background information provided by EPA regarding PRGs.

EPA shared spreadsheets containing draft revised PRGs with DOF to facilitate updating the site conceptual model of contamination for the CMS and identify data gaps. These PRGs will be used to refine the COCs to be evaluated in the upcoming CMS. Actual cleanup levels and points of compliance will be determined during the CMS process. It is possible that COCs may be added or removed for specific areas or throughout the site, as will be further determined in the CMS.

DOF performed the following steps to identify data gaps the new PRGs might present leading into the CMS.

- Compared highest historical concentrations of potential COCs to revised PRGs to determine which analytes have ever been detected above a potential PRG in various media.
- Reviewed how recently collected data (last five years) compared to draft PRGs.
- Reviewed recent data to determine if data are available for different areas of the site (i.e. inside and outside barrier wall).
- Reviewed other analytes of interest discussed with EPA.

Results of these steps are described below and tabulated summaries are included in Attachment 3.

Screening of Historical Highs

DOF screened the highest historical detection in groundwater against the draft 2020 PRGs provided by EPA. Constituents with a detection that exceeded those PRGs are:

Metals:

Aluminum	Iron	Nickel
Arsenic	Lead	Selenium
Cadmium	Manganese	Vanadium
Chromium (total)	Mercury	Zinc
Copper		

Volatile Organic Compounds (VOCs):

Benzene	Toluene
Ethylbenzene	Naphthalene

Semi-volatile Organic Compounds (SVOCs):

Pentachlorophenol	2-Methylphenol	Phenol
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DOF screened the highest historical detection in soil against draft 2020 PRGs. Constituents that only exceeded the PRG protective of groundwater were not included if they were not identified as a constituent of potential concern in soil via the above process, or groundwater data were not available. Constituents with a detection that exceeded those PRGs are:

Metals:

Antimony	Arsenic	Barium
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Cadmium
Chromium
Cobalt
Copper

Iron
Lead
Manganese
Mercury

Nickel
Selenium
Vanadium
Zinc

VOCs:

Benzene
Ethylbenzene

Formaldehyde
Toluene

~~Trichloroethene~~
Naphthalene

SVOCs:

Pentachlorophenol
Benzo(a)pyrene
Benzyl alcohol

Bis(2-ethylhexyl)phthalate
2,4-Dimethylphenol
Fluoranthene

2-Methylphenol
4-Methylphenol
Phenol
2-Propanol

Pesticides:

Alpha chlordane
4,4'-DDD

4,4'-DDE
4,4'-DDT

Dieldrin
Chlordane

PCBs:

Aroclor 1254

PCBs, Total

Sediment screening is pending receipt of 2020 Lower Duwamish River sampling and will be assessed once those data are received later in 2021. EPA has shared preliminary results and expects a results report to be released this spring.

Recent Groundwater Data

Groundwater is currently monitored at a variety of wells for metals and VOCs (aluminum, arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, zinc, benzene, ethylbenzene, and toluene) as part of HCIM performance monitoring. SVOCs (including naphthalene) were monitored in 2015 across the site, but not since. Results were generally non-detect but reporting limits were higher than are attainable now.

See Attachment 3 for tabulated screening summary tables. This assessment will be reviewed and revised after completion of 2021 groundwater sampling events conducted as part of this data gaps assessment and groundwater sampling Rounds 91 and 93.

2.3.2. CONSIDERATION FOR POST-INTERIM MEASURES CONDITIONS

Several interim measures have been conducted at the facility since the original contaminant characterization work was completed in the 1990s. These actions need to be considered in planning for a final corrective measure at the site as they have altered and generally improved site conditions with regards to remaining contamination. Figure 4 shows the approximate locations of interim measures described in this section.

2.3.2.1. 1995 Interim Measures

Polychlorinated biphenyls (PCBs) were removed from soils, process drains, and storm sewers at the Facility in 1995. Activities were summarized in a 1998 Interim Measures Report (Rhodia, 1998). The PCBs were detected during RFI sampling in the area of a concrete autoclave compressor pad and a sewer line. Once the concrete compressor pad was removed, the underlying soil in an area approximately 16 feet by 21 feet to a depth of 10 feet was excavated for disposal. Confirmation soil samples results showed PCB concentrations all below 2.5 mg/kg.

PCBs were also detected in a decommissioned buried 8-inch drainpipe discovered during installation of underground power lines. A trench was excavated with soil removed from an area 31 feet long by five feet wide trench and 3.75 feet deep and several areas were widened based on soil sampling performed during the excavation. Confirmation soil samples showed one sample with a result slightly higher than the other area of cleanup (31.12 mg/kg Aroclor 1254). Sewer lines were also cleaned at this time since the plant had ceased operations and Metro had notified Rhone Poulenc Inc. that stormwater could no longer go to the sanitary sewer and needed to reroute to the Duwamish Waterway. The lines were cleaned prior to this modification. Groundwater was not recently tested in this area of the site. The location of both of these excavation areas are shown on Figure 4.

2.3.2.2. 1999-2002 Soil Vapor Extraction

A soil vapor extraction (SVE) interim measure to remove toluene from the subsurface in the area near the former toluene storage tank was completed in 2002. This area is located south of Building 3 and shown on Figure 4. This SVE system operated from October 1999 through November 2002. Approximately 61,300 pounds of toluene and other volatile chemicals were documented as removed from the subsurface by this system (AMEC, 2014).

2.3.2.3. 2003 Hydraulic Control

Hydraulic control included a barrier wall, extractions wells, hydraulic control monitoring wells, conveyance piping, and pre-treatment system (Originally installed in the Main Distribution Center Building [Building 3, Figure 3]). The barrier wall was designed and constructed in 2002-2003 to encircle the areas of historical releases of primary COCs to the extent possible. It is located approximately 50 feet inland from the shoreline due to stability constraints and to allow for potential future shoreline habitat restoration, as shown on Figure 2.

2.3.2.4. 2006 Actions Triggered by Property Development

Several interim actions were conducted in 2006, conducted several voluntary interim measures to remove areas of contamination identified during demolition of aboveground structures at the facility. These were documented in the 2014 [Agency Draft](#) CMS Work Plan and various reports provided to EPA during the redevelopment of the facility. Work included:

- Demolition and removal of remaining historic structures, including remaining buildings and sumps.
- Demolition of the cement pad at the former hazardous waste storage area revealed oil-stained soils containing TPH in the oil and diesel ranges. These soils were excavated for off-site disposal.

- Contaminated soil was excavated along the northwestern corner of the property to remove soils affected by petroleum, copper, and other contaminants released by apparent historic dumping of materials along the northern property line (Geomatrix, 2007).
- Toluene impacts to soil and groundwater were identified on the border between the Museum of Flight and Container Properties parcels, resulting from a toluene release from an underground pipe. The pipe was cut, drained, and a portion was removed during the excavation work. To mitigate toluene-impacted groundwater in this area SVE and air sparging were conducted. Low levels of toluene remained in a small portion of the Museum of Flight property adjacent to the West Parcel following SVE Operations. The groundwater cleanup continued in a limited area in the southwest corner of the East Parcel and southeast corner of West Parcel via biosparging operations between 2012 and 2015. Four subsequent groundwater sampling events were conducted between September 2015 and July 2016, during which toluene concentrations remained below laboratory detection limits. The EPA determined in 2017 that the East Parcel cleanup was fully complete with no controls required (EPA, 2017).

In addition to removal of contamination and demolition of historic structures, new redevelopment on the West Parcel included (shown in Figure 2):

- The site was regraded and paved;
- A new stormwater system including new piping, catch basins, and treatment vault were added;
- A new GWPT building was constructed along the northern property line and extraction well piping was re-routed; and

While primarily done for property development, the combination of paving and stormwater improvements reduced infiltration of stormwater inside the barrier wall.

2.3.2.5. 2018-2019 CO₂ Pilot Study

The CO₂ pilot study was performed to assess the effectiveness and feasibility of CO₂ injection to neutralize high pH groundwater prior to preparation of the CMS. The pilot study was performed inside the barrier wall (Figure 4) to limit potential adverse effects during the study. The pilot study confirmed the technical feasibility of the technology, but indicated additional evaluation was necessary to implement full-scale use.

2.3.3. CONSIDERATION FOR RECENT CONTAMINANT CHARACTERIZATION

Historical soil and groundwater investigations conducted at the site have shown that the west side and southwest corner of the site have been affected by releases of potential COCs. Other ~~less significant~~ COCs at the site that have been investigated over time include polycyclic aromatic hydrocarbons, methylene chloride, benzene, PCBs, SVOCs, aluminum, arsenic, chromium, lead, mercury, nickel, vanadium, and dioxins/furans.

Historic data trends presented in routine performance monitoring reports have shown toluene to be the primary VOC observed and decreases in toluene concentrations have occurred at locations monitored inside the subsurface barrier wall (MW-17, MW-28, MW-29). Toluene has remained low in concentration at locations monitored outside the barrier wall since 2003. Trends in dissolved metals,

with copper being the primary metal detected, show copper trends are present, has decreased at exterior wells MW-40 and MW-41 and increased at interior pumping well EX-3. pH levels have remained generally stable, with higher pH found in the southwest corner of the site. Carbon dioxide treatment for in this area may have altered conditions in recent years. SVOCs were last tested across the site in 2015 and were not detected, but lower reporting limits are now attainable by the laboratory.

Preliminary reporting provided by EPA showed dioxins/furans and PCBs were recently detected in sediments as part of design investigations being performed as part of the Lower Duwamish Waterway Superfund cleanup. A former incinerator was identified in historical drawings as being present at one point near the shoreline north of the site (Figure 3 [Location 41]). Recent groundwater sampling has not included either dioxin/furan or PCBs at the site, though historical samples did not identify either of these as COCs in groundwater. Collection of samples near the shoreline and in areas related to historical use would allow for updating the current conceptual model and accounting for improved laboratory methods that can achieve lower reporting limits.

3. APPROACH

This section describes what additional data collection or analysis is proposed to address data gaps.

3.1. Preliminary Remediation Goals (PRGs) Update

As described in Section 2, initial screening of revised PRGs was performed in 2020 using historical site data. Additional sampling for groundwater and soil constituents was determined to be necessary to provide current site condition data for comparison against the revised PRGs. As part of completing the data gaps work, newly collected data will be screened against revised PRGs to develop a revised list of soil, groundwater, and sediment COCs.

3.2. Temporary Groundwater Pumping Cessation

The hydraulic control performance evaluation is targeted to coincide with falling river stage levels in the Duwamish Waterway generally observed in later winter or spring each year. Monitoring under passive hydraulic control conditions will include collection of:

1. ~~B~~Baseline water level and analytical data (prior to system shutdown) for comparison throughout the evaluation,
2. ~~M~~Monthly observation of water levels inside and outside the barrier wall (at multiple depths), and
3. ~~P~~Periodic field parameter and analytical monitoring of barrier wall perimeter monitoring wells, (depending on baseline observations.)

The approach to this task is outlined in the adaptive management flow chart presented in Figure 5. An adaptive management approach will be used to continually collect data, assess, and determine next steps over the course of the ~~approximately-planned~~ six month test period. The six month test period is inclusive of the annual sampling event (Round 93, September 2021) allowing for collection of groundwater samples within the subsurface barrier wall following water level equilibration. If data gaps are remaining after Round 93, then a request for an extension to the test period will be requested from EPA to allow for collection of additional data.

The combination of hydraulic information (vertical and horizontal gradients, water table elevation, etc.), field water quality parameters, and contaminant concentrations will be utilized to assess changes in fate and transport inside and outside the barrier wall. Trends and changes in this data will be compared over the test period and also compared to the extensive historic data sets from previous performance monitoring. The baseline data, in concert with the decades of historic data, will aid in evaluation of changes and may help determine the cause of changes (i.e. if changes are a result of movement across the wall or water coming up through the aquitard or changes in environmental conditions from an outside influence).

If data collection indicates a threat to water quality outside the HCIM as detailed in Figure 5, system pumping will resume in accordance with the Revised Operation, Monitoring, Inspection, and Maintenance Plan (AMEC Geomatrix, 2010).

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3.2.1. BASELINE MONITORING

As initial round of water level measurements and groundwater quality sampling will be conducted prior to system shutdown to provide a baseline data set for evaluation purposes during pumping cessation. Water level measurements will provide data for calculation of horizontal and vertical gradients inside and across the barrier wall ~~as a basis to further~~ understand the changing gradients that may occur during the test. Groundwater quality samples will provide initial concentrations for use in determining monitoring requirements during pumping cessation.

Water level measurements will be measured at the wells shown in Figure 6 ~~gathering including data~~ from wells near the barrier wall on both the inside and outside, as well as centrally located within the wall where there are well pairs with multiple screen intervals. These same wells will continue to be monitored throughout the performance evaluation period.

Analytical samples will also be collected from the wells shown in Figure 7, gathering data from wells near the barrier wall on both the inside and outside.

3.2.2. WATER LEVEL MONITORING

As part of performance monitoring, water levels are monitored on a quarterly basis. Water level monitoring during the pumping cessation will increase in frequency for both those collected manually and via transducer measurement. During the evaluation period, monthly water level measurements will be collected within the barrier wall; and transducers currently installed in wells MW-51, MW-52, and MW-53 will be set to record groundwater elevations hourly (Figure 6). The transducer in MW-47 will be set to record hourly and will be moved to MW-54, allowing for continuous water level monitoring for the upper and lower zone well pair (MW-53 and MW-54). Monitoring will provide adequate spatial coverage and frequency to assess performance of the barrier wall while water levels inside equilibrate and allow for detection of changes in gradients that may require additional analytical monitoring to assess the potential to accelerate contaminant migration across the wall. Historic transducer water level data from MW-49 and DM-8 provides decades of data for comparison to help assess if changes due to pumping cessation are out of the previously normal range.

Previous water level observations have generally shown an upward hydraulic gradient from the deep aquifer to the lower zone of the shallow aquifer, through the aquitard. Changes in the gradients (direction and size) and water level ~~sounding~~ in the ~~lower zone~~ wells will be monitored during the pumping cessation period and compared to the baseline results, as well as historical gradients and water levels, to evaluate changing conditions as water levels within the barrier wall rise. Due to variations in lithology (heterogeneity) within the deep aquifer, variability across the site is expected.

3.2.3. ANALYTICAL WATER QUALITY MONITORING

Water quality monitoring (Analytical and field parameter monitoring) will be used to assess the impact of ~~rebounded water levels~~ water level rebound within the barrier wall on COCs, i.e. the potential mobilization of COCs within the vadose zone and the potential cross barrier-wall/aquitard COC transport. ~~The rebounded water levels will also allow for assessment of cross barrier wall COC transport when the inward hydraulic gradient, maintained by active pumping, is no longer present.~~

~~Chemical~~ Analytical and field parameter monitoring will be conducted at key locations identified following baseline monitoring through the adaptive management flow chart (Figure 5). From this flow chart, wells will either be sampled on a monthly or semi-annually basis for COCs outlined as part of the baseline monitoring event.

The objective of the of the water quality monitoring is to assess changes in groundwater chemistry inside and outside the wall and to determine the potential for COC migration from the interior of the site to the exterior wells with or without the ~~barrier wall~~ hydraulic containment measure. ~~General water quality parameters (pH, oxidation/reduction potential [ORP], dissolved oxygen, specific conductance, and temperature) reached steady state conditions as of September 2005 (AMEC Geomatrix, 2009).~~

~~This~~ The baseline monitoring data set along with previous semi-annual performance monitoring baseline data collected, will be used as a basis for assessing changes in groundwater chemistry comparison during the passive evaluation period. These general parameters are helpful for evaluating changes in geochemistry. General water quality parameters (pH, oxidation/reduction potential [ORP], dissolved oxygen, specific conductance, and temperature) reached steady-state conditions as of September 2005 (AMEC Geomatrix, 2009). Significant change in pH or ORP could indicate changes in potential for metals migration or adsorption. Groundwater flow through the wall is very slow and semi-annual monitoring has proved to be sufficient for cross-wall geochemical changes (AMEC Geomatrix, 2009).

If contaminant concentrations are greater inside the barrier wall than outside the barrier wall, more frequent monitoring will be conducted throughout the duration of the pumping cessation to check for signs of migration. If concentrations are greater outside the wall than inside the wall, then wells will be monitored semi-annually, coinciding with performance monitoring events. If contaminant concentrations outside the wall begin to increase during the evaluation period and are projected to exceed PRGs within five years from the sampling date, the pumping system would be restarted.

~~Chemical monitoring will be conducted at key locations identified following baseline monitoring through the adaptive management flow chart (Figure 5). From this flow chart, wells will either be sampled on a monthly or semi-annually basis for COCs outlined as part of the baseline monitoring event.~~

3.2.4. TREATMENT SYSTEM OPERATIONS DURING EVALUATION

The HCIM will be switched to passive operations, with the groundwater pretreatment system extraction wells turned off during the evaluation. Power to the treatment system will remain on to allow recording of the water levels in wells MW-49 and DM-8. During the evaluation, the system will be periodically cycled to verify functionality. The granular activated carbon (GAC) vessels will be drained between cycling events to prevent fouling during the extended period of shut down.

3.3. Groundwater Sample Collection

As described in EPA's March 2021 letter, EPA and DOF collaborated over several technical meetings to establish a specific groundwater sampling task to address uncertainty associated with the current conditions, as presented in the 2014 Agency Draft CMS work plan, and to adequately more precisely determine the nature and extent of contamination. Groundwater samples will be collected from a broader suite of wells and for a broader suite of potential COCs than has ve previously been tested and thereby provide a current snapshot of conditions. Data collected will also inform the performance

evaluation during groundwater pumping cessation and the geochemical conditions in the vicinity of the CO₂ pilot study.

Figure 7 shows the sampling to be conducted to address this current data gap and includes testing for all of the analytes mentioned in EPA's 2021 letter. Table 1 summarizes the samples to be collected and ~~Table 2 summarizes~~ the rationale for this sampling. An updated version of the project Quality Assurance Project Plan (QAPP) was also prepared and will be submitted to EPA concurrent ~~to~~ with this work plan. The QAPP ~~was updated to account~~ s for current staff, the data gaps ~~scope of work~~, and updated sampling methods to attain the mandated lower reporting limits.

4. DATA COLLECTION METHODS

This section describes the methods to be used to implement the various pre-CMS data gap tasks.

4.1. Well Inspection and Rehabilitation

~~Some Twenty-five~~ of the wells identified for monitoring are not part of the current performance monitoring well network and therefore have not been inspected or sampled in years. ~~For these wells, along with currently monitored wells, an were~~ inspected ~~an was performed~~ to verify suitability for sampling groundwater and to evaluate if redevelopment will be necessary prior to sample collection. Inspection of the monitoring wells included removal of the dedicated pump(s), if necessary, and measuring the total depth to evaluate siltation at the bottom of the well. Recent sampling data were reviewed to evaluate if evident decreases in purge rates or water level drawdown occurred outside of allowable ranges.

Seven wells were identified for redevelopment. A summary of the inspection and recommendation was submitted via email to EPA on March 26, 2021 to allow for appropriate redevelopment of wells as much ahead of before groundwater sampling as practicable. Well development will follow EPA's Ground Water Forum document *Monitoring Well Development Guidelines for Superfund Project Managers* (EPA, 1992).

4.2. Groundwater Elevation Monitoring

Manual water levels will be measured either during a low tide or high tide to minimize tidal influence ~~of tidal changes~~ during the measurement period, per procedures identified in the Performance Monitoring Plan (AMEC Geomatrix, 2009). The observed groundwater elevation conditions will be compared to similar tidal conditions observed during the baseline monitoring event along with the ~~and other~~ monthly groundwater elevation measurements.

The water level information taken from the transducers loggers will be downloaded monthly during the manual water level measurement collection events. The transducer water level data for DM-8, MW-49, ~~MW-47~~, MW-51, MW-52, ~~and~~ MW-53 and MW-54 will be tracked ~~throughout for the duration of~~ the pumping cessation period.

4.3. Groundwater Sample Collection

Groundwater samples for laboratory analysis will be collected as described in Section 3.3. Groundwater sample collection procedures will follow ~~those outlined in~~ the Performance Monitoring Plan (AMEC Geomatrix, 2009) and ~~updated Interim Measures Performance Monitoring Plan~~ Revised Quality Assurance Project Plan (DOF, 2021). All exterior monitoring network wells along the west and south portions of the barrier wall will be sampled ~~on during~~ a falling tide. During purging, general water quality parameters will be monitored for stabilization in all wells prior to sampling.

Based on discussions with EPA, we have considered and incorporated additional sample collection protocols to account for the collection of samples being analyzed for potential COCs that are particularly susceptible to bias from higher turbidity or background contamination. These protocols include:

- Sample collection outside the subsurface barrier wall ~~is~~ (tidally influenced), requiring sample collection ~~on~~-during a falling tide when the groundwater flow direction is from the inland source area to the waterway.
- A peristaltic pump or dedicated bladder pump will be used to purge and sample wells. For wells sampled by peristaltic pump, the tubing will be disposable single use low-density polyethylene and silicone tubing. Pump and tubing intake for sample collection will located at the center of the well screen interval.
- Sample~~ing~~ locations will be purged for a minimum of 15~~-~~minutes (five stabilization readings, collected every ~~3~~three~~-~~minutes).
- A water quality instrument will be used to ~~determine-establish~~ stabilization of the following water quality parameters prior to sampling:
 - *Turbidity*: Turbidity > 5 NTU, ±10%; if 3 readings < 5, consider stabilized (NTU)
 - *Dissolved Oxygen (DO)*: DO > 0.5, ±10%; if 3 readings < 0.5, consider stabilized (mg/L)
 - *Specific Conductance*: ±3% (S/cm)
 - *Temperature*: ±1 degree C
 - *pH*: ±0.1 standard units
 - *Oxidation Reduction Potential*: ±10 mV
- The water level meter will be washed onsite with warm tap water and non-phosphate detergent prior to use ~~on-site~~ and rinsed with laboratory-provided DI prior to placement down the well.
 - For wells to be sampled for PCBs, decontamination of the water level meter will include a final rinse with hexane and laboratory DI rinse.
- Low flow purging will continue for a maximum of ~~two~~2~~-~~hours to achieve a turbidity less than 5 Nephelometric Turbidity Units (NTU) prior to sample collection. If turbidity does not decrease to below 5 NTU, two samples will be collected and analyzed, one for total and one for filtering, by the analytical laboratory for PCB analysis, dioxins and furans, and SVOCs.
 - If sample volume is collected for laboratory filtering, additional volume will be collected for total suspended solids (TSS), total dissolved solids (TDS), total solids, chloride, specific conductance, and dissolved organic carbon (DOC).
 - Laboratory filtering will be through a 1 micron filter.

⊖ Other standard operating procedures and equipment calibration requirements are included in the Performance Monitoring Plan (AMEC Geomatrix, 2009) and the Revised Quality Assurance Project Plan (DOF, 2021). The field log for groundwater sample collection is included as Attachment 4. All purge water and decontamination water generated as part of groundwater sample collection will be processed through the pre-treatment system and discharge to King County.

4.4. Groundwater Pumping System Monitoring

During the period of pumping cessation of the groundwater pretreatment (GWPT) system, the GAC treatment vessels will be drained to reduce biological growth within the treatment media. The vessels will be drained through movement of hoses to allow the units to gravity drain to the sewer line.

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~~Following After~~ draining, the hoses will be re-installed in their normal orientation, in the event the system ~~needs-must be to~~ restarted.

Quarterly cycling of the GWPT system will be ~~necessary-done~~ to ~~assure an operational confirm~~ ~~functionality of the~~ system, in the event the evaluation indicates restart of the system is ~~required~~~~necessary~~. This cycling will include manual operation of each of the three individual extraction wells for a 20 minute period (one hour total) and then turning all pumps to automatic operation to confirm proper function of the Programmable Logic Controller (PLC). During cycling of the system, purge water from groundwater monitoring will be processed through the GWPT system. Following the quarterly cycling, the GAC units will be drained as discussed above.

5. REPORTING

This section discusses ~~the~~ reporting approach ~~to be used~~ for the pre-CMS data gaps work.

Progress Reporting

The quarterly Progress Reporting frequency will be increased to monthly during implementation of the work plan. The progress reports will include the following items, in addition to standard progress reporting requirements discussed in the Performance Monitoring Plan (AMEC Geomatrix, 2009):

- Monthly water level measurements;
- Validated analytical data, as it becomes available;
- Discussion of chemical concentration projections, in relation to the adaptive management flow chart provided as Figure 5;
- Documentation of operational decisions made in cooperation with EPA; and
- Discussion of quarterly treatment system operations and maintenance testing.

~~Current-Pre-CMS~~ Conditions Report

A Current Conditions Report will be prepared following conclusion of the work plan tasks and the September Round 93 sampling event. The report will provide:

- A summary of the results of samples collected to address data gaps;
- A discussion of current constituent concentrations relative to historical data;
- An updated description of the nature and extent of contamination that incorporates data collected as part of these tasks as well as pending relevant data from outside sources such as the Lower Duwamish Waterway Group;
- An evaluation of the HCIM hydrogeologic system and effect on contaminant concentrations and transport during the period of temporary pumping cessation;
- Discussion of engineering design data collected to further evaluate long-term effectiveness of the CO₂ neutralization technique used in the pilot study; and
- Revised constituents of concern based on data comparison to the updated PRGs.

This report will provide the additional data necessary to begin preparation of the CMS for the site. The report will also include results from the Round 93 performance monitoring event (September 2021) and will be submitted on the schedule for the Round 93 report (60 days after the validated data set is received).

6. SCHEDULE

Following ~~acceptance~~ EPA's approval of this work plan, (assumed to occur in April 2021), ~~collection of~~ baseline groundwater samples ~~would occur~~ will be collected as close to the seasonal decrease in river stage as practical. Collection of the Round 91 performance monitoring samples will coincide with the baseline sample collection. Following completion of the baseline sampling event, the groundwater pump and treatment system (system) will be turned off, allowing water levels inside the barrier wall to begin to rise. Following the system shutdown, monitoring will be adaptively managed per the adaptive management flow chart provided as Figure 5.

Monthly groundwater levels and sample collection ~~would~~ will occur per Figure 5 and if conditions warranted restart of the system, the pumping cessation test ~~would~~ will be abandoned and pumping ~~would~~ resume to attain the 1-foot differential across the barrier wall. If conditions do not ~~arise~~ warranting restart of the system, the pumping cessation will continue until Round 93 sampling occurs in September 2021. At the conclusion of the test, the data report discussed above ~~would~~ will be prepared to coincide with submittal of the Round 93 performance monitoring report.

Periodic-Regular communication between DOF and EPA will continue throughout the implementation of the work plan to ~~communicate~~ discuss field activities and results, allowing for adaptive management during implementation.

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Tables

Figures

Attachment 1

Relevant 2014 Draft CMS Work Plan Maps & Technical Meeting
Figures

Attachment 2

List of Hazardous Constituents and Maximum Concentrations
(provided by EPA)

Attachment 3

Tabulated Preliminary Screening Tables and PRGs

Attachment 4

Groundwater Sampling Field Log

Revised Quality Assurance Project Plan

FORMER RHONE POULENC SITE

TUKWILA, WASHINGTON

April ~~5~~22, 2021

Prepared for:
Container Properties, LLC
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Prepared by:
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Certification

On behalf of the respondents, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this Revised Quality Assurance Project Plan is true, accurate, and complete. As to those portions of the report for which I cannot personally verify accuracy, I certify under penalty of law that this report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who may manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: _____
Ms. ~~Nat~~Fasya Gray, DOF, Project Coordinator

Date: _____

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Document Approval Signatures:

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FIGURES

Figure 1	Project Organizational Chart
Figure 2	Site Location
Figure 3	Current Site Layout

APPENDICES

Appendix A	Laboratory Method Forms
Appendix B	Laboratory Quality Assurance Plan

ACRONYMS AND ABBREVIATIONS

BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CMS	Corrective Measure Study
COC	Chain of Custody
DOF	Dalton, Olmsted, & Fuglevand, Inc.
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
GPS	Global Positioning System
HCIM	Hydraulic Control Interim Measure
LCS	Lab Control Sample
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MQO	Measurement Quality Objectives
PMP	Performance Monitoring Plan
PQL	Practical Quantitation Limit
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative Percent Difference
SDG	Sample Delivery Group
VOC	Volatile Organic Compound

1. PROJECT/TASK ORGANIZATION

This section describes the key project personnel, their responsibilities, and lines of authority and communication with regard to quality assurance/quality control (QA/QC) procedures. This organization facilitates the efficient production of project work, allows for a review of data quality, and permits resolution of any QA issues prior to submittal of deliverables.

This 2021 version of the Quality Assurance Project Plan (QAPP) is based on previous versions of the project QAPP (AFW, 2016), and has been updated to account for:

- New project personnel,
- Additional project tasks, and
- Updated analytical methods and reporting limits.

This project is being completed by Container Properties, LLC, and Dalton, Olmsted, and Fuglevand, Inc. (DOF). DOF is the environmental consulting company responsible for implementation of this program and for technical quality of deliverables under the Administrative Order of Consent executed with the U.S. Environmental Protection Agency (EPA), Region 10, in May 1993. DOF project personnel and responsibilities are described below. A project organizational chart is provided as Figure 1.

1.1. Project Manager

The DOF Project Manager is ultimately responsible for the technical quality, schedule, budget, and staff resources for the project. This person is responsible to the lead agencies for fulfilling contractual and administrative control of the project, providing overall technical direction and oversight, and providing overall review of project deliverables. Other duties consist of providing concise technical work statements for project tasks, assigning project team members, determining and coordinating subcontractor participation, providing overall technical direction to field staff, supervising project staff, establishing budgets and schedules, adhering to budgets and schedules, and allocating resources for field tasks.

Nat Fasya Gray is the DOF Project Manager.

1.2. Project Engineer

The DOF Project Engineer is responsible for design and construction of remedial and interim remedial measures at the site. Responsibilities include identifying data pertinent to design or monitoring of remedial systems at the site for collection under this QAPP.

Patrick Hsieh is the DOF Project Engineer.

~~1.2.~~ 1.3. Field Coordinator

The DOF Field Coordinator is responsible for daily management of activities in the field. Specific responsibilities include the following.

- Coordinate data collection activities to be consistent with information requirements.
- Supervise the compilation of field data and laboratory analytical results.
- Verify that data are correctly and completely reported.
- Implement and oversee field sampling in accordance with project plans.
- Coordinate work with on-site subcontractors.
- Schedule sample shipment with the analytical laboratory.
- Verify that appropriate sampling, testing, and measurement procedures are followed.
- Coordinate the transfer of field data, sample tracking forms, and log books to the Project Manager for data reduction and validation.
- Maintain proper chain-of-custody (COC) protocols, consistent with this Quality Assurance Project Plan (QAPP), during all steps of data collection.
- Participate in QA corrective actions as required.

Trevor Louviere is the DOF Field Coordinator.

1.3.1.4. Quality Assurance Leader

The DOF QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data and is responsible for QA oversight for analytical data quality evaluation and validation. The QA Leader has the following responsibilities.

- Serve as the official contact for laboratory data QC concerns. Respond to laboratory data QA/QC issues, resolve chemistry data quality issues, and answer requests for guidance and assistance.
- Review the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintain the authority to implement corrective actions as necessary.
- Review the laboratory QA Plan and request any additional required QA measures.
- Evaluate the laboratory's final QA report for any condition that adversely affects data quality.
 - Performed by James McAteer of QA/QC Solutions LLC as part of data validation.
- Verify that appropriate sampling, testing, and analysis procedures are followed and that correct QC checks are implemented.
- Monitor subcontractor compliance with data quality requirements.
- Implement corrective actions as necessary.
- Evaluate and validate the laboratory analytical data and qualify data as necessary.

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- Verify that correct QC checks for sampling, testing, and analysis procedures are implemented and documented.
- Manage electronic data as data are received and reviewed.

The DOF QA Leader is Trevor Louviere.

1.4.1.5. Laboratory Project Manager

The subcontracted laboratory conducting sample analyses for this project is required to obtain approval from the QA Leader before initiating sample analysis, to ensure that the laboratory analytical plan complies with the project QA objectives. The laboratory's Project Manager will ensure that project requirements are met and is responsible for project QC. Specific responsibilities of this position include the following.

- Verify implementation of the laboratory QA Plan.
- Serve as the laboratory point of contact.
- Implement corrective action and notify the QA Leader for out-of-control events.
- Issue the final laboratory data reports, including case narratives in both hardcopy and electronic data deliverable (EDD) formats.
- Comply with the specifications established in the project plans related to laboratory services.
- Participate in QA audits and compliance inspections (as applicable).

The Laboratory Project Manager for this project is Kelly Bottem of Analytical Resources, Inc.

1.5.1.6. Principal Data Users/Decision Makers

The lead agencies participating in decision making for the project, and their representatives, are:

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2. PROBLEM DEFINITION/ BACKGROUND AND PROJECT OBJECTIVES

This QAPP outlines procedures to be followed so that data collected and analyzed for the former Rhone Poulenc site are valid, verifiable, and meet project objectives. This QAPP was developed to address tasks related to performance monitoring as part of the Interim Measures implementation ~~and; soil and groundwater analyses conducted as part of the pre-CMS Data Collection Work Plan; and soil and groundwater analyses conducted to complete the corrective measures study.~~

The QAPP serves as the primary guide for the integration of QA and QC functions into project activities. The QAPP compiles the organization, objectives, and specific QA/QC activities required for project implementation and assessment. The outline and format of the QAPP comply with the policies and guidance specified in the EPA Requirements for Quality Assurance Project Plans (EPA, 2001).

The former Rhone-Poulenc facility (the site) is located on the Duwamish Waterway at 9229 East Marginal Way South, Tukwila, Washington. The site occupies approximately 14.4 acres in the city of Tukwila in Seattle's South End Industrial District (Figure 2). Historically, the site occupied approximately 25 acres. In 2006, the original site was divided into two separate parcels: the West Parcel (current site) and the East Parcel (6.6 acres). The East Parcel was remediated in 2006–2007 (Geomatrix, 2008) and later sold to the Museum of Flight Foundation; this property is currently referred to as the Museum of Flight property. The West Parcel consists of an upland area, a shoreline, and a tideflat that extends into the Duwamish Waterway. Most of the site's upland area is paved. The tideflat is composed almost entirely of sediments that are exposed during normal low tides. The West Parcel is currently referred to as the former Rhone-Poulenc site. Figure 3 shows the current site layout.

Industrial operations on the original property date back to the 1930s, when I.F. Laucks built a pilot plant to formulate glue for use in plywood manufacturing. In 1949, Monsanto Chemical Company (Monsanto) purchased the site and continued the manufacture of glue, as well as paints, resins, and storage of wood preservatives. In 1952, Monsanto commenced vanillin production on the property in addition to previous products. Dry glue and resin production ceased in about 1969. Hardener and extender production stopped in 1970 (PRC, 1990). Vanillin production continued at the site after Monsanto sold the property to Rhone-Poulenc in 1985. Rhone-Poulenc stopped chemical operations in April 1991, and in January 1998 transferred title to the property to Rhodia, Inc., who sold the property to Container Properties LLC, the current owner, in November 1998.

The Resource Conservation and Recovery Act corrective action process at the site to date are described in the Draft Corrective Measures Study Work Plan (AMEC, 2014).

Container Properties, LLC implemented an interim action, the hydraulic control interim measure (HCIM), to control contaminant migration from the site to the Duwamish Waterway in 2002–2003. HCIM construction was completed in April 2003 and documented in the Hydraulic Control Implementation Report (RCI, 2003). The HCIM included the installation of a subsurface low-permeability barrier wall that surrounds, to the extent practicable, the environmentally impacted upland portion of the site. The area surrounded by the barrier wall is shown in Figure 3. The barrier wall is complemented by a system of

groundwater extraction wells that pumps groundwater from inside the contained area to establish and maintain an inward-directed groundwater gradient. The recovered groundwater is pretreated in a permitted, on-site treatment system and is discharged to a King County treatment works. A monitoring well network inside and outside the barrier wall has been monitored per the Interim Measures Performance Monitoring Plan (PMP) (AMEC Geomatrix, 2009).

2.1. Data Quality Objectives

This QAPP outlines procedures to be followed so that data collected and analyzed for this project are valid, verifiable, and meet project objectives. Data collection under this QAPP will:

1. Supplement engineering design information that will be used to assess corrective measures alternatives in the CMS.
2. Update the understanding of current contaminant conditions.
3. Monitor the effectiveness of the hydraulic control interim measure.

Additional details and actions to be taken about under the current project phase are provided in Section A63.

3. PROJECT/TASK DESCRIPTION

Groundwater ~~and soil~~ samples will be collected to support the Hydraulic Control Interim Measures as well as ~~future~~ sampling conducted during Pre-CMS Data Collection Work Plan Implementation. The activities planned for each type of sampling event are described below.

3.1. Performance Monitoring

Performance monitoring is conducted according to the PMP and consists of the following tasks:

- Measuring water levels to determine if the interim action system is providing adequate hydraulic containment.
- Collection and analysis of groundwater samples to determine if the barrier wall has controlled the release of constituents of concern, or if mobilization of constituents of concern outside and in the vicinity of the wall has occurred. Samples will be analyzed for general water quality parameters (pH, oxidation/reduction potential, dissolved oxygen, specific conductance, turbidity, and temperature), the volatile organic compounds (VOCs) benzene, toluene, ethylbenzene, and xylenes (referred to as BTEX compounds), and total metals.
- Though groundwater samples are currently analyzed for BTEX compounds using EPA Method 8260C and total metals using EPA Methods 200.8 and 6010C, additional analyses ~~may will~~ be conducted on groundwater samples ~~from future sampling events, as the related to the Pre-CMS Data Collection Work Plan~~ corrective measures implementation progresses. The anticipated groundwater methods are included in Appendix A. If groundwater samples are analyzed by

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methods not included in this QAPP, the work plans prepared for the investigations will identify the methods and the data quality objectives that must be achieved by those methods in addition to ~~referencing~~ updating this QAPP.

3.2. Corrective Measures Implementation

~~Soil and g~~Groundwater samples will be collected according to work plans submitted for investigative work performed to support the corrective measures study, such as the Pre-CMSPilot Study Data Collection Work Plan, which is currently being prepared. ~~Soil and g~~Groundwater samples will be collected to determine field conditions prior to, during, and after completion of any investigations conducted to support the corrective measure study.

Additional details regarding the background, purpose, and scope of this project, including the number of samples to be collected, analyses requested, sample locations, and schedule will be submitted separately in work plans developed specific to each investigation.

4. CRITERIA FOR MEASUREMENT OF DATA

The overall objective of this QAPP is to ensure that the sampling design, field procedures, laboratory procedures, and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (precision, bias, accuracy, completeness, and reporting limits) and qualitative factors (representativeness and comparability). The measurement quality objectives (MQO) associated with these data quality factors are provided by the laboratory and included in Appendix A. The MQOs are further discussed in Section 4.1 through 4.7.

4.1. Precision

Precision is the agreement among a set of replicate measurements without assuming knowledge of the true value. Precision is measured for this project by calculating the relative percent difference

Relative percent difference (RPD) for field duplicate and lab duplicate results. Precision is optimized by collecting data at multiple locations and adhering to strict procedural guidelines that minimize possible sample contamination.

RPD results that are outside the control limits listed in Appendix A for laboratory duplicates and Section 7.5.1.3 for field duplicate samples will be qualified appropriately during data validation.

Field precision will be assessed through the collection and measurement of field duplicates at a rate of one duplicate per 10 field groundwater samples. These analyses measure both field and laboratory precision. The results, therefore, may have more variability than laboratory-generated duplicates.

Laboratory precision is assessed through analysis of duplicate spiked and/or unspiked samples, as specified by the analytical method. Specific discussion of the different types of laboratory duplicate samples is found in Section 7.5.2.

The RPD value will be calculated according to the following formula:

$$RPD(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \times 100$$

Where:

D1 = Concentration of analyte in sample.

D2 = Concentration of analyte in duplicate sample.

The calculation applies to field duplicate samples, split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. During data validation, the QA Leader will evaluate all RPD values and take action as described in EPA guidance (EPA, 2014a and b).

4.2. Bias

Bias is systematic deviation of a measured value from the true value. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample. Bias will be minimized for this project by standardizing field activity methodologies, including methods for equipment decontamination, sample collection, field observation and documentation, sample transport, and COC control. Descriptions of these methodologies are included in the PMP and work plans.

4.3. Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will depend on a combination of random error and of common systematic error (or bias). Accuracy will be evaluated for this project by evaluating laboratory spike sample recoveries that represent the difference between an observed value and an accepted reference value. Control limits for spike recoveries have been documented by the project laboratory and are shown in Appendix A. The laboratories periodically update their control limits as described in their QA Plan, which is attached in Appendix B. The most current control limits will always be used to evaluate laboratory results. Results showing noncompliant recoveries will be qualified appropriately during data validation. In general, if percentage recoveries are consistently low, nondetect results may indicate that compounds of interest are not present when in fact these compounds are present. In these circumstances, detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are consistently high. In such case, nondetect values are typically not affected, while results for detected analytes may be higher than the true value. Accuracy will be optimized for this project by using procedures designed to reduce potential error that might impact the accuracy of results. Proper decontamination methods and equipment will be used during field activities to ensure accurate results. The laboratory QC procedures, described in Section 7.5.2, also reduce error to improve accuracy.

During data validation, the QA Leader will evaluate all percentage recovery values and take action as described in EPA guidance (EPA, 2014a and b).

4.4. Representativeness

Representativeness is the measure of how well data reflect the actual environment and the conditions under which the data are collected. Representativeness will be optimized for this project by using general historical and investigative information to determine proper locations of new sampling points that represent the areas of concern surrounding the site. The methodologies used to collect samples and measurements are also designed to collect representative data with minimal disturbance of the environment from which they are collected.

To be considered representative, a data set should accurately and precisely represent the actual site conditions. Determination of the representativeness of the data will be performed by:

- Comparing actual sampling procedures to those prescribed in the PMP, applicable work plans, and this QAPP;
- Comparing analytical results from field duplicates to determine variation in the analytical results; and
- Flagging nonrepresentative data as invalid or identifying data that are noncompliant with project specifications.

Only representative data will be used in subsequent data reduction, validation, and reporting activities.

4.5. Comparability

Comparability is how well multiple data sets can be used for a common interpretation. Comparability will be optimized for this project by using the same standards for data collection at each location, using the same analytical laboratory, if possible, to analyze the ~~soil and~~ groundwater samples, and by using the same analytical procedures and QA procedures that are used during other sampling events at the site.

4.6. Completeness

Completeness is a measure of the amount of data collected found to be valid in relation to the total amount of data intended to be collected according to the sampling design. Completeness will be optimized for this project by having all analytical results validated by a data validator to assess the validity of the data and, where necessary, by performing field work in a multi-phased progression so that sufficient data are collected.

The number of samples and results expected establish the comparative basis for completeness, which is defined as a ratio of acceptable measurements (including estimated data) obtained to the total number of planned measurements for an activity. Completeness (%C) can be calculated as follows:

$$\%C = \frac{(\text{number of acceptable data points})}{(\text{total number of data points})} \times 100$$

The data quality objective for completeness for this project is 100 percent useable data for samples/analyses planned. If the completeness goal is not achieved, an evaluation will be made to determine if the data are adequate to meet study objectives. Completeness below 100 percent will require review of the sampling objectives in order to determine whether further sampling and analyses may be required.

4.7. Reporting Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Although results reported near the MDL provide insight

into site conditions, QA requires that analytical methods achieve a consistently reliable level of quantitation known as the practical quantitation limit (PQL), also referred to as the reporting limit. The laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

Ideally, the laboratory's reporting limits (PQLs) should be low enough to compare to preliminary remediation goals (PRGs) for the site. A reasonable level of effort will be exercised to achieve these goals. Analytical methods will be selected to provide a PQL lower than the PRG whenever possible. Groundwater PQLs are provided for each method in Appendix A.

~~Soil PQLs are also provided for each method in Appendix A. While there currently is not a monitoring program in place for soil, the method that achieves the best PQL for the project will be selected prior to the field investigation implementation.~~

The reporting limits listed in Appendix A are considered "target" reporting limits, because several factors may influence laboratory PQLs and individual sample quantitation limits. Analytical procedures may require sample dilutions and/or cleanup and reanalysis to accurately quantify a particular analyte at concentrations above the range of the instrument. Also, physical conditions (e.g., moisture, compaction, composition) affect detection limits. The effect is that other analytes may be reported as undetected at a PQL much higher than a specified regulatory screening level. Every effort will be made to select methods that achieve PQLs that meet PRGs, including selecting methods that use selected ion monitoring to achieve lower PQLs, if necessary. During data validation, data will be evaluated and the most appropriate result for each analyte will be reported.

5. SPECIAL TRAINING/CERTIFICATIONS

All field personnel will have completed 40-hour Occupational Safety and Health Administration Hazardous Waste Site Operations training. No additional special certification is anticipated to be required for this project. Personnel involved in this project will be trained in sampling methods, sample handling, COC, sample transport, and field and laboratory measurements. The project manager and/or QA officer will be responsible for training staff who perform sampling, sample handling, and analyses activities.

A Washington State Licensed Geologist or Hydrogeologist will sign and certify all monitoring reports and boring logs prepared under this project. The licensed geologist will directly supervise all well installation, sampling, and reporting for the project, as required by the State Department of Licensing as required by Revised Code of Washington Chapter 18 Section 220.

6. DOCUMENTS AND RECORDS

A schedule of deliverables for this project is provided in the Interim Measures PMP and the Pre-CMS Data Collection Work Plan (Work Plan). Field logbooks, notebooks, and/or data sheets will be filled out using "write in the rain" ink. Changes will be made by crossing out errors and adding correct information. Any deviation from this QAPP will be noted in the field notes. All field and data records will

be managed and maintained by Dalton, Olmsted, & Fuglevand, Inc. Analytical data will be maintained in both hard copy and electronic format.

7. DATA GENERATION AND AQUISITION

This section specifies field and laboratory procedures for data collection. For data collection methods and sampling information related to the Pre-CMS Data Collection Work Plan (Work Plan) see Section 4 and Figure 5 of the Work Plan. See Section 6 for discussion of the implementation schedule.

7.1. Sampling Process Design

The sampling design, including figures showing field work locations and tables of samples to be collected, are included in the PMP and the Pre-CMS Data Collection Work Plan, and other work plans submitted to submitted prior to implementing soil and groundwater investigations to support the Corrective Measures Implementation.

7.2. Sampling Methods

Procedures for all field activities are described in the PMP or the associated wWork planPlan.

All instruments used in the collection of samples will be properly calibrated according to the manufacturer's recommendations and decontaminated between samples (if the instrument is reusable and comes in contact with samples). All samples will be placed in iced coolers immediately following sample collection, and strict COC control will be maintained at all times. Samples will be delivered or shipped to Analytical Resources, Inc. in Tukwila, Washington.

7.2.1. SAMPLE IDENTIFICATION

Samples will be named and numbered as follows. Each field and QC sample will be assigned a unique alphanumeric identification code (identifier) for submittal to the laboratory so that the laboratory is unable to identify the sample location. Each sample will be identified with the letters "RP," followed by the date of the sample, followed by a number to indicate the sequence in which the sample was collected. The blind sample identifiers will be noted on the field sheets and in the field book. For instance, the third groundwater sample collected on March 23, 2021, from monitoring well MW-43 would receive the following identifier:

RP032321-03.

Soil samples will be collected in the same manner as groundwater samples, labelled blindly according to the sample date, and followed by a hyphen and a subsequent numerical value corresponding to the number of samples collected that day.

7.2.2. SAMPLE LABELING

A label will be securely attached to every sample container. Each label will include the following information:

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- Sample identifier;
- Project/location name;
- Date and time of collection (using 24-hour time clock to minimize potential confusion about a.m. and p.m.; e.g., “1300” vs. “1:00 p.m.”); and
- Analyses to be performed.

7.2.3. FIELD LOG MAINTENANCE

All sample location descriptions, sample identifiers, and analyte lists will be recorded in the field log. The field log will include the following information:

- All incidents observed during each sampling event;
- The names of all personnel on site involved in the sampling event;
- The major events that occurred during the day;
- Details about field procedures conducted; and
- Details about samples collected or problems that occurred.

7.2.4. SAMPLE CONTAINERS AND PRESERVATIVES

Table 3 and 4 the laboratory forms provided in Appendix A specify the required containers, sample size, preservation protocol, and holding times for the list of analyses to be performed for ~~soil and~~ groundwater samples. All sample containers will be provided by the laboratory and will include the appropriate preservatives.

Sample containers will be placed in opaque, insulated coolers packed with ice to minimize their exposure to light and to cool them approximately to the recommended temperature. The coolers will be packed with sufficient packing material to prevent sample container breakage and/or leakage during transport.

The project manager and field personnel will plan sampling activities, and coordinate sample delivery with laboratory personnel, so that the sample holding time limits and temperatures specified in Appendix A are not exceeded.

7.2.5. SAMPLE STORAGE AND TRANSPORTATION

The exteriors of all sample containers will be wiped clean after they have been closed. Blank (QC) samples will be packaged with the regular samples that they control. Any vacant space in the cooler will be filled with ice or packing materials. If the cooler has a drain, it will be taped shut. Each cooler will then be secured with packing tape.

7.3. Sample Handling and Custody

COC procedures will be followed by all project personnel to document sample transfer, sample possession, and sample integrity, from the time of sample collection through the completion of sample analysis. A COC form will be initiated at the time of sampling, and will accompany the samples at all times including upon receipt at the project laboratory. The project laboratory maintains an internal custody protocol. The COC form has blank fields for entering the sample identifier, the date and time of sample collection, the name of the person who collected the sample, and the requested laboratory analyses. Each COC form will be signed by every person who handles the sample containers. Sample transfers will be noted on the COC form for each sample.

The COC form documents sample identifications; sample dates and times; the sample matrix and the number of sample containers associated with each sample; and the analyses required for each sample. This is the principal document shared by the sample generator and the project laboratory.

Therefore accuracy and completeness are extremely important. Personnel initiating the COC form will refer to the field forms and the field log (described below) to access the required information. This continuity will help make the various forms of documentation consistent and reduce the risk of error. The COC form will accompany all samples during transport. The field sampler also will keep a copy of the COC form for the project file.

All samples will be delivered directly to those laboratory personnel who are authorized to receive samples (sample custodians). When the laboratory receives the samples, the sample custodian will inspect the exterior condition of the shipping container. Then the sample custodian will open and examine the interior of the shipping container. Next the sample custodian will examine the sample containers, measure the temperature of the samples, and check the contents of the shipping container against the COC form. The sample custodian will record any inconsistencies or problems with the sample shipment (breakage or signs of leakage, and missing or extra samples) on the COC record, and notify the DOF QA Leader for immediate resolution. Official acceptance of sample custody will be documented by the sample custodian's signature on the COC form. The samples will then be tracked through the laboratory by the laboratory's internal custody procedures.

7.4. Analytical Methods

Appendix A contains the target reporting limits for the analytical methods used for groundwater analyses. The analytical and QA/QC procedures used by the laboratory are described in the laboratory QA Plan, included as Appendix B of this QAPP.

7.4.1. LABORATORY MEASUREMENT PROCEDURES

Chemical analysis methods were selected on the basis of detection and quantitation limits and the level of analytical QC needed to meet data quality objectives and intended data uses. EPA methods, as referenced in Appendix A, will be used for all analyses

The contracted laboratory will be included in the analytical planning and will provide the data validator with documented performance characteristics (precision, bias/accuracy, and sensitivity) for all

requested analytical methods. Additional considerations for specific method selection or modification may be:

- Definition of the parameter and the forms to be measured (i.e., dissolved and/or total metals);
- Concentration ranges;
- Number of samples to be analyzed per analytical batch;
- Sample size available;
- Holding time requirements;
- Cost of analysis.

The target reporting limits listed in Appendix A are the lowest groundwater reporting limits available compared to the most recent EPA PRGs. For analytes with no EPA PRG, the standard laboratory reporting limits are included in Appendix A.

7.4.2. FIELD MEASUREMENT PROCEDURES

Field equipment will be used in general accordance with the manufacturer's recommendations. More details on field procedures are provided in the PMP or associated work plan.

7.5. Quality Control

This section outlines QC procedures to be followed by both the field personnel and the analytical laboratory. Following these QC procedures will support the development of a complete and accurate data set following laboratory analysis and data validation. In this section, a sampling event is defined as consecutive days of sampling not separated by more than two days of inactivity. QC sample types and required frequency are summarized in Table 1.

7.5.1. FIELD QUALITY CONTROL

Field QC samples are collected and analyzed to assess sample collection techniques, possible sources of contamination, interferences that may be attributed to the sample matrix, and, to some degree, the bias and precision of the reported results. Field QC will be evaluated, along with laboratory QC, by the data validator during data review and validation. Affected data will be qualified in accordance with EPA guidelines (EPA, 2014a and b). A description of each type of QC sample is described below. For the purpose of this discussion, the term "regular sample" is defined to be a field sample of environmental medium (e.g., groundwater ~~or soil~~) other than a field QC sample.

7.5.1.1. Rinsate and Field Blank Samples

Rinsate blanks are collected to determine the potential for cross-contamination of samples during collection. Rinsate blanks will be collected and analyzed at the rate of 1 per 20 samples if utilizing non-dedicated sampling equipment. If dedicated or disposable sampling equipment is utilized, field blanks will be collected instead. Rinsate blanks will consist of store-bought distilled water collected from the

final rinse of sampling equipment after decontamination. Field blanks will consist of store-bought distilled water transferred directly into sample containers in the field.

All rinsate or field blanks will be submitted blind to the laboratory, with sample numbers that are indistinguishable from primary samples, following the same sample identification scheme as primary samples. Blank samples will be analyzed for the same parameters as the associated field samples.

7.5.1.2. Trip Blanks

Trip blanks monitor VOC contamination that may be introduced into samples during shipment and storage. Trip blanks will consist of carbon-free deionized water prepared in the laboratory and shipped with sample containers. The trip blanks remain with the sample containers until samples are collected and then the sealed trip blanks are shipped back to the laboratory with the project samples and analyzed for VOCs. A trip blank shall be included in each cooler of samples shipped to the laboratory for VOC analysis and analyzed for VOCs.

7.5.1.3. Field Duplicates

Field duplicates are used to assess the homogeneity of samples collected in the field and the precision of sampling methods. Groundwater field duplicates will be collected at a rate of 1 per 10 samples per sampling event. ~~Field duplicates will not be collected for soil samples due to the heterogeneity of soil samples.~~ Field duplicates will be collected only for sampling events in which more than five samples are collected. Field duplicates are collected by filling a second set of sample containers from the same location as a regular sample, using the same sampling methods and equipment. Field duplicates should be collected at locations with suspected contamination. Field duplicates will be submitted blind to the laboratories, with sample numbers that are indistinguishable from primary samples. The control limit for groundwater field duplicate RPDs is 20 percent for metals, 25 percent for dioxins/furans, and 30 percent for all other organics.

7.5.1.4. Matrix Spike/Matrix Spike Duplicates

Matrix spikes are used to assess sample matrix interferences and analytical errors, as well as to measure the accuracy of the analysis. Known concentrations of analytes are added to environmental samples; the MS and MSD samples are then processed through the entire analytical procedure and the recovery of analytes calculated. Results are expressed as percent recovery of the known spiked amount. MS/MSD sample volume should be submitted at a rate of 1 per 20 samples collected, or one per field mobilization at a minimum. All MS/MSD samples should be noted on the COC form. MS samples should be collected at relatively “clean” locations. MSD samples are used to assess both accuracy and precision.

7.5.2. LABORATORY QUALITY CONTROL

The project laboratory is required to adhere to specified criteria in the following areas to verify the validity of data being produced:

- Holding times;
- Instrument tuning;

- Initial calibrations and continuing calibration verification;
- Method blanks;
- Surrogate spike compounds;
- MS/MSD;
- Laboratory control samples (LCS);
- Laboratory duplicates; and
- Internal standards.

Details are provided in the laboratory QA Plan provided in Appendix B.

7.5.2.1. Initial and Continuing Calibration Samples

The laboratory will perform instrument calibrations specified in the analytical methods and track and control standard solutions used in the calibration procedures per the laboratory QA Plan in Appendix B.

7.5.2.2. Laboratory Method Blanks

According to the EPA (2014a and b), “the purpose of laboratory (or field) blank analyses is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks).”

Method blanks are laboratory QC samples that consist of ~~either a contaminant-free soil-like material or~~ deionized water. Method blanks are created in the laboratory during sample preparation and follow samples throughout the analysis process. Given method blank results, validation guidelines aid in determining which substances in samples are considered “real” and which ones are inadvertent contaminants of the analytical process. During data validation, the QA Leader will evaluate all method, trip, and field blank sample results and take action as described in EPA reference documents (EPA, 2014a and b); professional judgment will be applied as necessary.

7.5.2.3. Surrogate Spikes

Accuracy of an analytical measurement is evaluated by using surrogate spikes. Surrogate compounds are compounds not expected to be found in environmental samples; however, they are chemically similar to several compounds analyzed in the methods and behave similarly in extracting solvents. Samples for organic analyses will be spiked with surrogates compounds consistent with the requirements described in the analytical methods.

Percent recovery of surrogates is calculated concurrently with the analytes of interest. Since sample characteristics will affect the percent recovery, the percent recovery is a measure of accuracy of the overall analytical method on each individual sample.

7.5.2.4. Matrix Spike/Matrix Spike Duplicates

Matrix spikes are used to assess sample matrix interferences and analytical errors, as well as to measure the accuracy of the analysis. Extra volume will be collected at a rate of 1 for every 20 samples collected, or 5 percent, for each analytical method. The laboratory divides the sample into equal aliquots, and then spikes each of the aliquots with a known concentration of target analytes. The MS is then processed through the entire analytical procedure and the recovery of the analytes calculated. Results are expressed as percent recovery of the known spiked amount. MS samples should not be collected from locations with potentially high concentrations of target analytes that may mask the added MS compounds. Per the individual methods, some analyses do not require MS/MSDs. In addition, some analyses only require an MS and not an MSD.

Because MS samples measure the matrix interference of a specific matrix, only MS samples from each investigation will be analyzed, not samples from other projects that may be batched together with project samples by the laboratory.

MS/MSD data are reviewed in combination with other data quality indicators (e.g., LCS/LCS duplicates) to determine matrix effects. In some cases, matrix effects cannot be determined due to dilution and/or high levels of related substances in the sample.

7.5.2.5. Laboratory Control Spikes/Laboratory Control Spike Duplicates

The purpose of the laboratory control spike samples (also known as blank spikes) is to aid in assessment of overall accuracy and precision of the entire analytical process (e.g., sample preparation, instrument performance, and analyst performance). A laboratory control spike will be prepared and analyzed at a minimum of one laboratory control spike with each batch of 20 samples or fewer for each matrix. Laboratory control spikes are similar to matrix spikes; however, the laboratory control spike medium is “clean” or contaminant free.

7.5.2.6. Laboratory Replicates/Duplicates

Precision for inorganic analytes is monitored by analysis of nonspiked sample replicates/duplicates. Laboratory duplicate sample analysis for inorganic analytes will be prepared and analyzed at a minimum frequency of 5 percent, or one laboratory duplicate with each batch of 20 samples or fewer for each matrix.

7.6. Instrument/Equipment Testing, Inspection, and Maintenance

Field and laboratory instrumentation will be examined and tested prior to being put into service and will be maintained according to the manufacturer’s instructions. Sampling personnel will maintain a supply of typical maintenance replacement items available in the field to help prevent downtime because of equipment malfunctions. Examples of typical equipment maintenance items may include filters, tubing, fittings, sample containers, and calibration standards.

Field equipment will be serviced before the project is initiated and at regular intervals during the project as required by the manufacturer’s instructions. All laboratory instruments will be maintained as

specified in the project laboratory's QA Plan and according to manufacturer's instructions. Manufacturer's instructions will be followed for any additional equipment that is required for the project.

7.7. Instrument/Equipment Calibration and Frequency

Field and laboratory instrument calibration will be conducted in accordance with the QC requirements identified in the manufacturer's instructions and the laboratory analytical methods. General requirements are discussed below.

7.7.1. FIELD INSTRUMENTS

All calibration procedures and measurements will be made in accordance with manufacturer's specifications. Field instruments will be checked and calibrated prior to their use, and batteries will be charged and checked daily where applicable. Instrument calibrations will be performed at the beginning of each work day and checked and recalibrated if necessary through the course of the day according to manufacturer's specifications or if deemed necessary by sampling personnel.

All documentation pertinent to the calibration and/or maintenance of field equipment will be maintained in an active field logbook. Logbook entries regarding the status of field equipment will contain the following information:

- Date and time of calibration;
- Name of person conducting calibration;
- Type of equipment (make and model);
- Reference standard used for calibration;
- Calibration and/or maintenance procedure used; and
- Any other relevant information.

7.7.2. LABORATORY INSTRUMENTS

As stated in EPA SW-846 and applicable laboratory standard operating procedures, calibration of all analytical instrumentation is required to ensure that the analytical system is operating correctly and functioning at the sensitivity required to meet project objectives. Each instrument will be calibrated with standard solutions appropriate to the instrument and analytical method, in accordance with the methodology specified and at the QC frequency specified in the analytical methods.

The calibration and maintenance history of the fixed laboratory instrumentation is an important aspect of the overall QA/QC program. As such, all initial and continuing calibration procedures will be implemented by trained personnel following the manufacturer's instructions and in accordance with applicable EPA protocols to ensure the equipment is functioning within the tolerances established by the manufacturer and the method-specific analytical requirements.

7.8. Inspection/Acceptance of Supplies and Consumables

All equipment, meters, kits, and supplies will be checked upon receipt by the Quality Assurance Leader or his/her designee to ensure that they are within technical specification before use. Chemicals will be checked for expiration date, sufficient quantity, and discoloration. Sample containers will be obtained from the subcontracted laboratory. Deionized water will be obtained for use in decontamination and for blanks.

7.9. Non-Direct Measurements

Not applicable.

7.10. Data Management Procedures

The sampling and reporting schedule is described in the PMP or applicable work plan. The laboratory will follow their QA Plan for data reduction procedures. The laboratory will deliver final data within approximately 21 days from the end of sampling, unless a shorter turnaround time is requested. QA/QC Solutions ([James McAteer](#)) will validate the chemical data within approximately 30 days of receipt from the laboratory. Data transfer will be performed using EDDs, beginning with laboratory reports and including data validation activities. Dalton, Olmsted, & Fuglevand, Inc. will upload the EDDs to a project-specific database that will be subsequently used to output tabulated data for reporting and assessment purposes. A global positioning system (GPS) unit with submeter accuracy will be used to locate sample points, where applicable, and the information will then be included in the database for mapping purposes.

7.10.1. LABORATORY DATA REPORTS

The laboratory data reports will consist of data packages that will contain complete documentation and all raw data to allow independent data verification and validation of analytical results from laboratory bench sheets, instrument raw data outputs, chromatograms, and mass spectra. Each laboratory data report will include the following:

- Case narrative: The case narrative will identify the laboratory sample delivery group (SDG) number and will describe the analytical methods used and discuss any irregularities encountered during sample analyses and any resulting data qualification. The laboratory project manager or their designee must sign the case narrative.
- Copy of COC forms for all samples included in the SDG.
- Analyte concentrations: Tabulated sample analytical results with units, data qualifiers, percent solids (where applicable), sample weight or volume, dilution factor, laboratory batch and sample number, field sample number, and dates sampled, received, extracted, and analyzed all clearly specified. Surrogate percent recoveries will be included for organic analyses.
- Method reporting limits (described elsewhere as PQLs): Method reporting limits achieved by the laboratory will be presented with the analyte concentrations.

- All calibration, QC, and sample raw data including bench sheets, preparation logs, chromatograms, mass spectra, quantitation reports, and other instrument output data.
- Blank summary results indicating samples associated with each blank.
- MS/MSD result summaries with calculated percent recovery and RPDs.
- Laboratory duplicate result summaries with calculated RPDs.
- Laboratory control sample results, when applicable, with calculated percent recovery.
- Laboratory data qualifier codes and a summary of code definition: Data qualifiers will appear next to analyte concentrations, and associated definitions will be summarized in the report.
- EDD version of results: A full set of results in database format including full listing of valid values (e.g., CAS numbers, analytical methods, etc.).

7.10.2. PROJECT DATABASE

Container Properties, LLC and/or its contractor will use a relational database management system to track and report the following:

- Sample station information including location, elevation, and field observations such as depth to groundwater, as well as monitoring well construction ~~and soil boring~~ details.
- Sample collection information including sample number, station, matrix, type of sample (field, blank, duplicate), date of collection, and laboratory SDG.
- Analytical results including concentration, units, qualifier and analytical method.

Laboratory EDDs will be directly loaded into the database management system, thereby avoiding hand-entry errors. After data validation is performed, the changes in values or qualifiers will be incorporated into the project database. The project manager will provide additional information such as location coordinates, sample identifiers associated with sample locations, and depth intervals from field sampling documentation forms. A report will be produced and verified against the validated laboratory data packages. Original laboratory results will be archived in project files.

7.10.3. RECORDS MANAGEMENT

The QA Leader will inventory and store all analytical data, including all resubmissions collected during data validation efforts, worksheets, original data validation reports, and associated sample collection paperwork.

8. ASSESSMENTS AND OVERSIGHT

The objectives of the PMP, QAPP, and other applicable work plans will be reviewed as data are received and used for reporting and other interpretive purposes. Data that do not meet the data quality requirements as described in the applicable work plan, PMP, and QAPP will be qualified or rejected during data validation. Rejected data will not be used for any purpose.

8.1. Assessments and Response Actions

The Project Manager or a designated reviewer will review the field forms following field work and the QA Leader will review associated laboratory reports during validation. The Project Manager is responsible for supervising and checking that samples are collected and handled in accordance with this plan and that documentation of work is adequate and complete. The Project Manager is also responsible for overseeing that the project performance satisfies the QA objectives as set forth in this QAPP.

Reports and technical correspondence will be peer reviewed by qualified individuals before being finalized.

The ultimate responsibility for maintaining quality at the site rests with the Project Manager. The day-to-day responsibility for assuring the quality of field and laboratory data rests with the Field Coordinator and the Laboratory Project Manager, respectively.

Any nonconformance with the QAPP will be identified and controlled. Where procedures are not in compliance with the QAPP, corrective actions will be taken immediately. Subsequent work that depends on the nonconforming activity will not be performed until the identified nonconformance is corrected.

Corrective action will be taken when warranted. Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or QC performance outside established criteria. Corrective action can occur during field activities, laboratory analyses, data validation, or data assessment. Corrective actions should be designed to correct the problem and to minimize the possibility of recurrence. Examples of corrective actions include modifying nonconforming procedures, forms, or worksheets; instituting a quality check; and the like. Proposed corrective actions should be reviewed and approved by the QA Leader prior to implementation. Significant noncompliance and corrective actions will be discussed in QA reports to the Project Manager and EPA, as appropriate.

8.1.1. FIELD CORRECTIVE ACTIONS

Project personnel will be responsible for reporting technical or QA nonconformances or deficiencies of any activity or issued document to the Field Coordinator. The Field Coordinator will consult with the QA Leader to determine whether the situation warrants subsequent corrective action. Corrective actions will be implemented and documented in the field record log. No staff member will initiate corrective action without prior communication of findings using the process described above. Upon implementation of any corrective action, the field manager will provide the Project Manager with a written memo documenting field implementation. The memo will become part of the project file.

8.1.2. LABORATORY CORRECTIVE ACTIONS

Corrective action by the laboratory may occur prior to or during initial analyses. Conditions such as broken sample containers, multiple phases, low/high pH readings, and potentially high-concentration samples may be identified during sample log-in or prior to analysis.

Laboratory corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, and who checks the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. If the problem persists, or cannot be identified, the problem should be referred to the supervisor, manager, and/or Laboratory Project Manager for further investigation and possible formal corrective action.

The contracted laboratory's QA Plan (Appendix B) includes specific procedures for identification and documentation of nonconformance and implementation and reporting of corrective actions.

8.1.3. CORRECTIVE ACTIONS RESULTING FROM DATA VALIDATION

Field and laboratory data generated for this project will be reviewed to ensure that all project objectives are met. If any nonconformances are found in the field procedures, sample collection procedures, field documentation procedures, laboratory analytical and documentation procedures, and data evaluation and quality review procedures, the impact of those nonconformances on the overall project objectives will be assessed. All communications will be documented in the data validation report.

8.2. Reports to Management

The reporting requirements for this project are included in the PMP or applicable work plan.

9. DATA VALIDATION AND USABILITY

Dalton, Olmsted, & Fuglevand, Inc. will be in charge of planning all field activities. Field forms, EDDs, and COC forms will be reviewed by the Dalton, Olmsted, & Fuglevand, Inc. Project Manager or designated personnel after the field work is completed. The forms will be checked to determine if the field staff followed all aspects of the work plan and QAPP methodologies, and any deviations from the specified procedures will be noted. Specifically, the forms will be reviewed for:

- Correct documentation of sample location;
- Complete and accurate procedures for sample collection or measurement and proper documentation;
- proper COC methodology, including sample shipment and preservation during transport; And
- Evaluation of field QC results as field QC sample contamination could result in data qualification.

9.1. Data Review, Validation, and Verification Requirements

The analytical laboratory will complete a data review and verification prior to producing results. This verification will include checking that QC procedures were included at the required frequencies and that the QC results meet control limits as defined in the laboratory's QA Plan (Appendix B). Any QA issues identified by the laboratory will be described in the case narrative and may result in qualification of some of the results by the laboratory.

9.2. Validation and Verification Methods

After receiving results from the laboratory, the data validator (~~QA Leader~~[QA/QC Solutions, James McAteer](#)) will prepare a data validation report (data validation review memorandum) in accordance with EPA guidelines (EPA, 2014a and b) and review 100 percent of the concentration data, equivalent to a Level 2B data review (EPA, 2009). After primary validation and secondary review, the data validator will add qualifiers and final concentrations to the laboratory EDD and laboratory hard-copy sheets. All manual data entry will be verified to the source document (e.g., COC, hard-copy data package, and/or qualified sample result summary).

The data validation review memorandum will provide a summary evaluation of:

- COC discrepancies;
- Case narrative;
- Analytical holding times;
- Preservation/temperature issues;
- Laboratory and field/equipment blank contamination;
- Initial and continuing calibrations;
- Surrogate compounds recoveries;
- MS and LCS recoveries and RPDs;
- Laboratory and field duplicate sample RPDs;
- Reporting limits; and
- Data completeness.

Qualifiers will be added to data during the review as necessary. Qualifiers applied to the data as a result of the independent review will be limited to:

- U – The analyte was analyzed for but was not detected above the reporting limit.
- J – The analyte was positively identified; the associated numerical value is an estimate of the concentration of the analyte in the sample.
- UJ – The analyte was not detected above the sample reporting limit. However, the reporting limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R – The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

9.3. Reconciliation with User Requirements

The project manager and QA Leader will review all data following each sampling event. If there are any QAPP problems with the sampling and analysis, these issues will be discussed with the regulatory agencies involved in the project to make sure that QAPP data quality objectives are being met.

10. REFERENCES

- Amec Foster Wheeler (AFW), 2016, Draft Quality Assurance Project Plan, Former Rhone Poulenc Site, Tukwila, Washington, May.
- AMEC Environment & Infrastructure, Inc. (AMEC), 2014, Agency Draft Corrective Measures Study Work Plan, Former Rhone-Poulenc site, Tukwila, Washington, September.
- AMEC Geomatrix, Inc. (AMEC Geomatrix), 2009, Interim Measures Performance Monitoring Plan, Former Rhone-Poulenc Site, Tukwila, Washington, November.
- EPA – see U.S. Environmental Protection Agency
- Geomatrix Consultants, Inc. (Geomatrix), 2008, East Parcel Corrective Measures Implementation Report, Former Rhone-Poulenc Site, Tukwila, Washington, June.
- PRC Environmental Management, Inc. (PRC), 1990, RCRA Facility Assessment, Rhone-Poulenc, Inc. Marginal Way Facility, March 19.
- RCI Construction Group (RCI), 2003, Hydraulic Control Implementation Report, Former Rhone- Poulenc Site, Tukwila, Washington, September 12.
- U.S. Environmental Protection Agency (EPA), 2001, EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, March.
- EPA, 2009, Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use, EPA 540-R-08-005, January.
- EPA, 2014a, U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review: EPA 540-R-014-002, August.
- EPA, 2014b, U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review: EPA 540-R-08-01, January.

Tables

Figures

Appendix A

Laboratory Method Forms

Appendix B

Laboratory Quality Assurance Plan

**EPA Comments for the
Draft Pre-CMS Data Collection Work Plan dated April 5, 2021
Former Rhone Poulenc Facility, WAD 00928 2302**

Comment Number	Page(s)	Section	Location	Comment	Response
1		General		The work plan must include further statements about the purpose and importance of pumping cessation, and what would be gained beyond that it will "allow for better evaluation of contaminant concentrations and migration." The work plan must also include further acknowledgement of EPA's expectation of a corrective measure that is not reliant on the HCIM. Section 2.1 says the information from pumping cessation will be useful to, "potentially allow for choosing a corrective measure that does not rely on the HCIM as a long-term solution." This statement acknowledges a goal of a corrective measure not relying on the HCIM, so then what is the necessity of knowing whether cross-wall migration is occurring, if the wall is not part of the solution? As a reminder, the HCIM, which includes both the wall and the pumping system, was never intended to be a final corrective measure. The EPA expects a corrective measure that addresses the contamination inside and outside the wall and therefore eliminates the need for the HCIM. Over time as the wall ages or in the event of a catastrophic failure, contaminants could be discharged from the area contained by the wall. The contaminants inside the wall must be treated, removed, or otherwise permanently controlled.	Section 2.1 has been amended to focus on the technical merits of the collecting data while pumping is off to explain why collecting data to evaluate the effect of the presence of the wall on the site groundwater conditions is valuable. The wall is one of the subsurface features that influences and will continue to influence the site conceptual model and must be considered as part of the basis for remedial design. The work proposed includes collecting data inside and outside the wall to inform the conceptual model, as EPA has stated is necessary for remedy design.
2	v, 4	Acronyms, 2.3	first bullet	PRG means Preliminary Remediation (not Remedial) Goal. Correct the term in these locations and others if necessary.	Acronyms & Abbreviations section and Section 2.3 have been revised
3	1	1.1	second paragraph	This section states that, "A draft CMS Work Plan was prepared in 2014 and several investigations and studies have been conducted since that time." There have been several investigations and studies over the years but not since 2014 except for the CO2 pilot study. Correct the text accordingly.	Text revised accordingly.
4	3	2	first and second bullets	The first two objectives should say "Collecting information that can be used for future evaluation of..." Edit accordingly.	Requested language added.
5	3	2.2	first paragraph	The term "disproportionate costs" is not clear. Please clarify in the text.	Section 2.2 has been modified to clarify.
6	4	2.3, All	first paragraph	As a reminder, EPA did not approve the draft CMS work plan and therefore DOF (and others) must be prudent in using conclusions presented in that document. For example, this section states that "The 2014 work plan concluded that sources are related primarily to the historical manufacture of artificial vanilla flavoring, or vanillin, through chemical processing of wood cellulose." EPA believes that while vanillin manufacturing was an obvious contributor to sources of contamination, it very likely was not the only one. This section implies that the other sources are insignificant or that the contamination is not a result of operations prior to vanillin manufacturing. Correct this paragraph to reflect this comment, and consider this reminder anywhere else the work plan references the draft CMS work plan.	Section 2.3 has been modified accordingly and noted for the future.
7	All	2.3, 3.3, All		In Sections 2.3 and 3.3, and throughout the work plan, ensure that the text always refers to the Agency Draft Corrective Measures Study Work Plan as "draft," because it was never finalized and may contain information that is incorrect or not approved by EPA.	References to the 2014 Agency Draft CMS Work Plan have been updated throughout the Work Plan.
8	4	2.3.1	second sentence	It seems like a word is missing after "groundwater" (perhaps contaminant?).	Sentence revised to address.
9	6	2.3.1		Under the screening of historical highs subheading, text relating to soil states, "Constituents that only exceeded the PRG protective of groundwater were not included if they were not identified as a constituent of potential concern in soil via the above process." Without having the entire PRG package, the reasoning for the exclusion of constituents with detections above only the protection of groundwater PRGs is out of context. EPA appreciates that DOF included relevant PRG tables in this work plan, but for completeness EPA would like the full set of tables and the writeup that accompanied the tables included, perhaps as an appendix.	Attachment 2 has been updated to include the full writeup and PRG tables provided by EPA. The tables of Attachment 3 have been updated with notes to clarify the comparisons made in the table and summarized in Section 2.3.1 of the Work Plan text.
10	6	2.3.1, Table 2 in Attachment 3		Under the screening of historical highs subheading, text relating to soil states, "Constituents that only exceeded the PRG protective of groundwater were not included if they were not identified as a constituent of potential concern in soil via the above process." For approximately half of the constituents that are listed on the bottom half of page 6, Table 2 in Attachment 3 indicates that these only exceeded one or both of the EPA RSL Soil Screening Levels to Protect Groundwater and not other soil criteria. Either correct the discrepancy, or clarify why these constituents are listed.	Soil constituents that were only detected above a screening level protective of groundwater were still included in the list in the text if those compounds were also detected in groundwater above a draft PRG for groundwater. They were also included in the list if no groundwater data were readily found in the project database or historical data summaries provided by EPA (Attachment 2). The text was slightly revised in this section to correct and clarify this approach.
11	8	2.3.2.4	first paragraph	A word is missing from the first sentence, after "2006." Please edit accordingly.	This sentence has been revised accordingly.
12	9	2.3.3		Add a short discussion of how contaminants may have changed over time, such as any general increase or decrease in areas inside or outside the wall.	A short discussion has been added to Section 2.3.3 providing discussion of long term trend observations and recent data.
13	10	3.2	second paragraph	Correct "outline" to "outlined".	This sentence has been revised accordingly.

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Comment Number	Page(s)	Section	Location	Comment	Response
14	10	3.2	second paragraph	Add more general discussion about what triggers turning back on the system. For example, is there specific information that you need to collect before this study is complete? If so, then when you have completed that collection, would you turn it back on in 3 months instead of 6? Or are you planning to shut down at 6 months regardless of the amount of data or results thus far? DOF will require approval from EPA to continue the pumping cessation past 6 months.	Additional text has been added to Section 3.2 to provide additional detail requested by the comment.
15	10-11, 13, Figure 6	3.2.2, 4.2	first paragraph	The explanation in the first paragraph of where water levels will be collected is confusing. Adjust Figure 6 (or add to Table 1 or 2) to show which wells are the final set of wells with transducers for this investigation, and which well measurements are to be collected hourly, monthly, or quarterly. Section 3.2.2 says that the transducer will be moved from MW-47 to MW-54, but Section 4.2 says MW-47 will have a transducer but does not mention MW-54. Correct the discrepancy.	Figure 6 has been updated to show the location of the transducers and is consistent with the Work Plan text. Section 4.2 was updated to include MW-54 (MW-47 removed).
16	Figure 6, Figure 7, Attachment 1	3.2.1, 3.2.3		Figure 6 shows water level monitoring to occur in the inside-outside pair of A2 U and MW-59 U. Figure 7 shows analytical monitoring in MW-59 U for select metals, but no analytical monitoring in A2 U. Based on Figures in Attachment 1, A2 U hasn't been sampled recently, and had a historical copper concentration above the PRG. Seems like A2 U should also be monitored for select metals both as part of the data gap groundwater collection (described in Section 3.3) to assess changes in groundwater chemistry and the potential for migration across the barrier wall at this location as it relates to the Temporary Groundwater Pumping Cessation (described in Section 3.2). Include this well as suggested or provide a response to this comment explaining why DOF does not believe it should be included.	Select metals analysis has been added to Figure 7 and Table 1 for baseline sample collection. Post-baseline monitoring of this location during the period of pumping cessation is not necessary because groundwater flow direction is expected to be toward the river and monitoring of MW-47 will provide relevant information.
17	11	3.2.3		This section discusses how general parameters will be used to assess whether there is migration to outside the wall. Are there controls in place for determining whether the observed changes are a result of movement across the wall versus water coming up through the aquitard or changes in environmental conditions from an outside influence? If so please add to the work plan.	Additional text has been added to Section 3.2, 3.2.2, and 3.2.3 to clarify how assessment will be performed.
18	13-14	4		Indicate if investigation-derived waste will be generated and identify any required parameters for disposal.	Statements were added to sections 4.2 and 4.3 to state purge water, decontamination water, and redevelopment water will be processed through the pre-treatment system.
19	13-14	4.3		Specify the depth of the pump intakes. For example, in the center of the well screen, at a certain depth above the bottom, elsewhere? Include field standard operating procedures, equipment calibration plans, and field logs as an appendix.	Samples will be collected from the mid-screen location at each well, this information was added to the second bullet in Section 4.3. A reference to the SOPs and equipment calibration plans present in the Performance Monitoring Plan & Revised QAPP has been added to the last paragraph of Section 4.3. An additional Attachment (Attachment 4) has been added to the document and includes the groundwater sampling form to be used during sampling.
20	15	5		EPA would like the title of the report to be, "Pre-CMS Conditions Report," or something similar since "current" time eventually will become outdated. In either this work plan or the report, include an appendix of all the well logs. In the report include tables by which we can compare the recent results with previous data from those same wells and parameters.	The report name has been updated to be "Pre-CMS Conditions Report." The report will include an appendix with well logs and the tables requested in the comment.
21		Table 1		Please clarify in the work plan why there are two different metals analyses to be used in this data collection, or the reason why you would not use the analysis which includes thallium for all the metals analyses.	A foot note has been added to Table 1 indicating that Thallium is being analyzed at locations required under the PMP, but not at other location because Thallium has not been detected during groundwater sampling in the last 5 years.
22		Tables 1 and 2		EPA suggests replacing Table 1 with Table 2. The only difference between the two is that Table 2 includes the rationale for not sampling MW-20. While that information is somewhat useful, it's the only well not being sampled that's included in Table 2.	The tables have been combined as suggested.
23		Table 2		Silica is not included for MW-45 or MW-46. The rationale in Table 2 for other wells for which silica applies is, "assessment of geochemical parameters to aid in assessing CO2 neutralization outside the barrier wall." It's unclear why MW-45 and MW-46 are not selected for silica. Either add the analysis for these wells or explain why they are not being sampled for silica.	pH in wells MW-45 and MW-46 is neutral and values have been stable since 2006 (see trends provided in Appendix C of 2020 Annual Report), Silica analysis was selected for locations with elevated pH.
24		Table 2		For wells DM-8, MW-22, MW-27, MW-28, MW-38R, MW-44, MW-47, and MW-49 -- include rationale for the SVOC analysis. For example, MW-22 is in the "pentachlorophenol handling area," like DM-4 and EX-1.	Rationale has been added to Table 1. Locations represent areas either in or near areas of the site where SVOCs were historically detected or known to be handled, and also provide a reasonable site-wide dataset inclusive of near-river locations.

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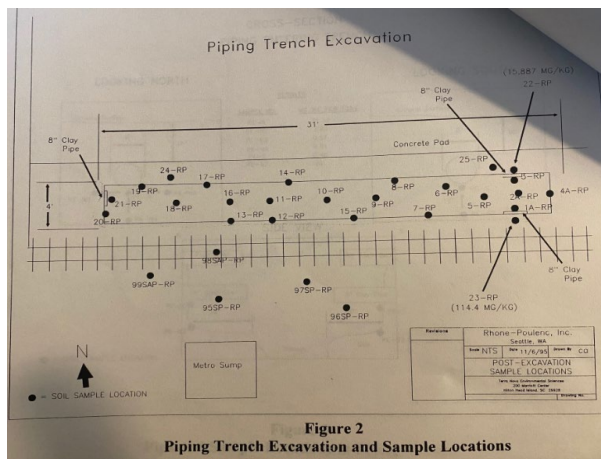
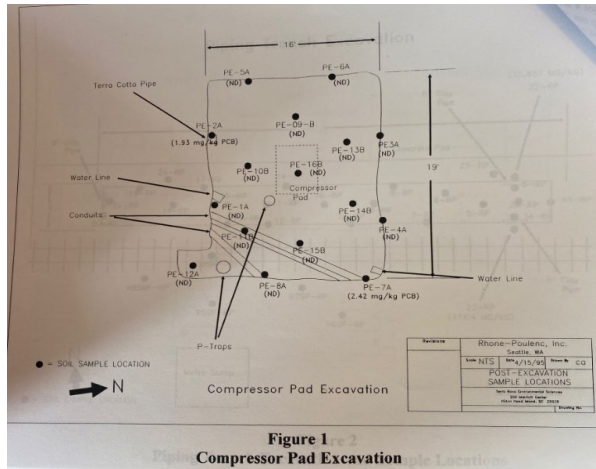
Comment Number	Page(s)	Section	Location	Comment	Response
25		Figures 3 and 4		<p>EPA appreciates the addition of the figures showing historic structures with the monitoring wells and other features.</p> <p>In Figure 4, the difference between the purple and pink shading is unclear. Add both to the legend.</p> <p>Per the 1998 Interim Measures Report, the location of the PCB excavation was near the south side of the autoclave building (#14 on historical maps, Figures 3 and 4) not the compressor pad (#18/19 on historical maps, Figures 3 and 4). Adjust the figure accordingly.</p>	<p>The two colors were initially used in Figure 4 because two areas overlapped. Shading has been modified and added to the legend per the comment. With regards to the location of the PCB excavation - we reviewed the 1998 report and also a 2004 Geomatrix report that pulled various historical maps together. See attached summary and historical maps.</p>
26		Figure 7; Attachment 1		<p>In Attachment 1, Figure 3-21 shows copper concentrations in well B2 U more than 100x the PRG. But the well doesn't appear on Figure 7 or on Attachment 1 Figure 5. What is the status of this well? If the well hasn't been abandoned and is functional, it might make sense to collect a sample in B2 U for metals also. Include this well as suggested or provide a response to this comment explaining why it is not to be included.</p>	<p>Well B2 was abandoned historically and carried over on maps. The well is no longer present and cannot be sampled.</p>

Work Plan Comment 25 Background Information

The April 8, 1998 Interim Measures Report prepared for Rhodia Figure 1 shows the Compressor Pad Excavation and the locations of samples PE-2A and PE-7A with PCB concentrations of 1.93 mg/kg and 2.42 mg/kg, respectively. Those sample locations PE-2A & PE-7A are also shown on Figure 2-4 (Soil Sample Location Map) of the November 2004 Geomatrix Draft Corrective Measures Study Uplands in relation to historical buildings. The location of this excavation is shown to be on the northwest corner of location 19 on Figures 3 & 4 of the Draft Pre-CMS Data Collection Work Plan, historically referred to as the Compressor Shed.

The 1998 Rhodia report also provides locations of samples related to the piping trench excavation (Figures 2 & 3). Figure 3 specifically shows residual PCB location PE-N with a PCB concentration of 31.12 mg/kg on the northern sidewall below the 8" clay pipe. This excavation area is shown on Figure 2-4 of the 2004 Geomatrix document mentioned above. The excavation is shown to be located on the southeast corner of building 15, historically known as the Oil Storage Area, which is connected to the Autoclave Building (Location 14 on Figures 3 & 4 of the Pre-CMS Data Collection Work Plan).

Based on these historical maps, the PCB compressor pad excavation was shown in the Draft Pre-CMS Data Collection Work Plan near location 19 and the PCB Piping Trench Excavation near locations 14/15.



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Revised Quality Assurance Project Plan - Draft Pre-CMS Data Collection, dated April 5, 2021
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Comment Number	Page(s)	Section	Location	Comment	Response
1		Distribution List		Add Kelly Bottem of Analytical Resources, Inc. to the distribution list. Limit this list in the QAPP to key players, such as those in the project organization section; the full document deliverable distribution list does not need to be listed here.	Kelly has been added to the distribution list and key players are the only individuals listed in the section, per the Organization Chart.
2		1, Project Organization Chart		Patrick Hsieh, and James Mc Ateer of QA/QC Solutions, LLC and their responsibilities are missing from this section. Please add them accordingly. EPA recommends also clarifying that Tasya Gray and Natasya Gray are the same person with two different spellings; or choose one spelling for consistency. It's not necessary to include Jennifer MacDonald in the Project Organization Chart as she is not part of the EPA technical team.	Patrick Hsieh and James McAteer have been added to the text section requested with their respective roles discussed. Natasya Gray has been identified in the text and any reference to Tasya has been removed. Jennifer MacDonald has been removed from the Organization Chart.
3	3	1.5		Limit the names in this section to Janette Knittel and Natasya Gray.	The only individuals listed are those requested.
4	3-4	2		Please state the decision(s) to be made, actions to be taken, or outcomes expected from the information to be obtained from this work; or refer to the sections in the work plan where this information is provided.	A new Section 2.1 has been added to the QAPP to include this information.
5	3-4	2		This project does not include soil sampling, therefore references to such should be removed here and elsewhere as needed. Also, this QAPP must cover only work to implement the HCIM PMP and Pre-CMS Data Collection work plan and not unknown future work to complete the CMS. Correct the second sentence to read, "This QAPP was developed to address tasks related to performance monitoring as part of the HCIM, and groundwater analyses conducted per the Pre CMS Data Collection Work Plan."	The text has been revised as requested.
6	4	2	fifth paragraph	Add "study" to the title of "Draft Corrective Measures Work Plan"	The text has been revised as requested.
7	4	2	last sentence	"Additional details about the current project phase are provided in Section A6." There is no section labeled A6 in the QAPP or the work plan. Correct accordingly.	The reference has been updated to refer to Section 3.
8	5	3	first sentence	As in the comment for Section 2, this project does not include soil sampling, therefore all references to such should be removed here and elsewhere as needed. Also, regarding "future" sampling, the QAPP should be written to adhere to the work plans that have already been developed and submitted, and not include any that are in development or waiting to be developed. If future work plans have different purposes and data quality objectives than those in the current QAPP, then they must have a QAPP written for those objectives. Therefore, correct the first sentence of Section 3 to state, for example, "Groundwater samples will be collected to support implementation of the Pre CMS Data Collection Work Plan in addition to the HCIM."	The text has been revised as requested.
9	5	3.1	third bullet	Again, If a future investigation is required then the Respondents will need to update the QAPP or create a new one to include that work. This QAPP is limited to the work being conducted under the HCIM PMP and the Pre-CMS Data Collection Work Plan.	The text has been revised as requested.
10	5	3.2		This section needs to be about implementation of the Pre-CMS Data Collection Work Plan, not future potential investigations related to corrective measures. Correct the title of this section to, "Pre-CMS Data Collection," and correct the text accordingly. Remove the reference to the Pilot Study Work Plan. Again, soil samples are not collected under this investigation. Correct the text accordingly. Similar to how Section 3.1 presents the tasks to be completed, add the work to be done in Section 3.2, such as dioxin/furans and PCB analyses.	The text has been revised as requested.
11		7		The QAPP should refer to the pre-CMS work plan Section 4, Section 6, and Figure 5, etc., for sampling information. The QAPP should reference Table 1 in the workplan for the samples to be collected for this specific project. In addition, a separate table should detail the appropriate containers, preservation, and holding time requirements for each analysis for clarity and for ease of data validation per section 9.2 of the QAPP.	References to these sections and figures have been added to section 7 of the QAPP. A new Table 3 has been added to the QAPP to summarize requested information.
12	12	7.3	last paragraph	The sample custodian should also measure the temperature inside the cooler.	The text has been revised as requested.
13		7.5.1.3, Appendix A		There appears to be a different RPD listed in two sections: 7.5.1.3 lists a groundwater field duplicate RPD of 30%, while Appendix A gives 20% RPD for metals, 25% for dioxins/furans, and 30% for all other organics. Please correct.	QAPP text has been corrected to match the RPDs provided in the Appendix.
14	13	7.5.1.4, Table 1		Section 7.5.1.4 discusses MS/MSDs as part of Field Quality Control, but are not included in Table 1 under the Field Quality Control heading. Please revise or clarify.	A clarifying footnote has been added to Table 1 to make it clear that while the MS/MSD is a lab quality control sample, it necessitates extra sample volume collection in the field.

**EPA Comments for the
Revised Quality Assurance Project Plan - Draft Pre-CMS Data Collection, dated April 5, 2021
Former Rhone Poulenc Facility, WAD 00928 2302**

Comment Number	Page(s)	Section	Location	Comment	Response
15	18, 21	7.10, 9.2		Clarify who will perform the data validation: the "QA Leader" referenced in 9.2, or the Data Validator from QA/QC Solutions, LLC in 7.10, (or both with different functions?)	James McAteer will perform validation of the data, the QA Leader will coordinate Lab and validation efforts. Text has been adjusted to make this clear.
16		Table 2		Highlight and indicate with a footnote where reporting limits do not meet the goal and exceed the PRGs (for example, aroclors).	PRGs less than the MRL have been bolded and a footnote has been added to the table to define this condition.
17		Table 2		The note "(see notes re: hardness)" is a carryover from the PRG tables and should be removed here to avoid confusion.	This note has been removed from the table
18		Table 2		Units are missing from Volatile Organic Compounds by EPA Method 8260D on page 35 of the pdf. Please correct.	The units have been added to Table 2 for VOCs.